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OF THE

ENGLISH LANGUAGE

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GEORGE EDWIN RINES

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THIRTY VOLUMES

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No. 1

SCHEME OF SOUND SYMBOLS

FOR THE PRONUNCIATION OF WORDS.

Note.—(-) is the mark dividing words respelt phonetically into syllables; (′), the accent indicating on which syllable or syllables the accent or stress of the voice is to be placed.

Sound-symbols employed in Respelling.	Representing the Sounds as exemplified in the Words.	Words respelt with Sound-symbols and Marks for Pronunciation.
ā	mate, fate, fail, aye	*māt, fāt, fāl, ā.*
ă	mat, fat	*măt, făt.*
â	far, calm, father	*fâr, kâm, fâ′thėr.*
ä	care, fair	*cär, fär.*
aw	fall, laud, law	*fawl, lawd, law.*
ē	mete, meat, feet, free	*mēt, mēt, fēt, frē.*
ĕ	met, bed	*mĕt, bĕd.*
ė	her, stir, heard, cur	*hėr. stėr, hėrd, kėr.*
ī	pine, ply, height	*pīn, plī, hīt.*
ĭ	pin, nymph, ability	*pĭn, nĭmf, ă-bĭl′ĭ-tĭ.*
ō	note, toll, soul	*nōt, tōl, sōl.*
ŏ	not, plot	*nŏt, plŏt.*
ô	move, smooth	*môv, smôth.*
ö	Goethe (similar to *e* in her)	*gö′tėh.*
ow	noun, bough, cow	*nown, bow, kow.*
oy	boy, boil	*boy, boyl.*
ū	pure, dew, few	*pūr, dū, fū.*
ŭ	bud, come, tough	*bŭd, kŭm, tŭf.*
ů	full, push, good	*fůl, půsh, gůd.*
ü	French plume, Scotch guid	*plüm, güd.*
ch	chair, match	*chär, măch.*
ċh	German buch, Heidelberg, Scotch loch (guttural)	*bôċh, hī′dėl-bĕrċh, lŏċh.*
g	game, go, gun	*gām, gō, gŭn.*
j	judge, gem, gin	*jŭj, jĕm, jĭn.*
k	king, cat, cot, cut	*kĭng, kăt, kŏt, kŭt.*
s	sit, scene, cell, city, cypress	*sĭt, sēn, sĕl, sĭt′ĭ, sī′prĕs.*
sh	shun, ambition	*shŭn, ăm-bĭsh′ŭn.*
th	thing, breath	*thĭng, brĕth.*
ṫh	though, breathe	*thō, brēṫh.*
z	zeal, maze, muse	*zēl, māz, mūz.*
żh	azure, vision	*ăżh′ėr, vĭż′ŭn.*

UNITED EDITORS' ENCYCLOPEDIA AND DICTIONARY.

THAN, conj. *thăn* [AS. *thonne,* than: Dut. *dan,* than, then: another form of *then*]: a particle used after the comparative degree and words expressing comparison or diversity, such as *other, otherwise;* and followed by the object compared. *Than* has the same case after it that it has before it: as, *he* is taller than *I* (am).

THANATICI, *tha-năt'ĭ-sī* [from Gr. *thanatos,* death]: technical term sometimes used to indicate lesions from violence tending to sudden death.

THANE, n. *thān* [AS. *thegen,* a thane: Icel. *thegn,* a brave man, a warrior: OHG. *degan,* a male, a soldier: Ger. *degen,* a warrior]: in *OE. hist.,* a member of the king's body-guard who on completion of his term of service received a grant of land: in *Scot.,* a hereditary tenant who paid the sum at which the lands were valued in the king's rental. THANAGE, n. *thān'āj,* lands or dignity of a thane; district in which a thane presided. THANE'DOM, n. *-dŭm,* district or jurisdiction of a thane. THANE'SHIP, n. *-shĭp,* state or dignity of a thane; the property. THANE-LANDS, possessions granted to thanes.—*Thane* is a title whose use in the early feudal ages has been much discussed. In England, in Saxon times, the king's thane was a 'miles emeritus,' who, on the cessation of his actual service about the king's person, received a benefice or grant of land. The term 'miles,' when used by Bede, is uniformly rendered 'cyninges thegn' by his Saxon translator. In the 10th century, all who would, in the feudal era, have been known as tenants *in capite,* were thanes. After the Conquest, thanes and barons are classed together; and in Henry I.'s time the terms seem to be used synonymously. The office or dignity appears to have been attached to particular estates; thane-lands are frequently mentioned in Domesday. After the reign of Henry II., the term fell into disuse. The title thane was introduced at a later period into n. Scotland, but not expressing the same rank as in England; the tenure not being military, but in fee-farm.—The Scottish thane seems to have been a hereditary tenant, paying the sum

at which the land stood in the king's rental, and retaining his ancient authority strengthened and legalized. The title was in occasional use in Scotland till the end of the 15th century. Hector Boece's notion of the Scottish thanes being all made earls, adopted in Shakespeare's *Macbeth,* has no historical foundation.

THANET, *thăn'ĕt,* ISLE OF: the n.e. corner of the county of Kent, England, separated from the mainland by the river Stour and its branches; bound north and east by the sea. It is 10 miles in length, 4 to 8 miles broad; 26,500 acres, of which 23,000 are arable. The surface is high but, in the main, level; the soil is, in general, light and chalky; the island, however, is rich and fruitful. On the shores are the well-known watering-places, Ramsgate, Margate, and Broadstairs; and on the North Foreland, in the n.e., there is a light-house 340 ft. above sea-level, and visible 22 miles. Pop. (1901) 71,518.

The Isle of Thanet, the old British name of which was *Ruim* (a headland), was formerly separated from the mainland by a sea-passage, called the Wantsome, which in Bede's time was one-third of a mile wide, and was passable only at Sarre and Wade. The Wantsome was the general sea-passage toward London for Danish ships, but in 1500 it became finally closed.

THANK, v. *thăngk* [Goth. *thagkjan;* Ger. *denken,* to think: AS. *thanc,* thought, thanks: Goth. *thagks,* thanks: comp. Gael. *taing,* gratitude, thanks: closely allied to THINK]: to express one's gratitude for a favor or for a kindness—often used in a contrary and ironical sense. THANKS, n. plu. expression of gratitude for a favor or a kindness; often used familiarly instead of *thank you.* THANK'ING, imp. THANKED, pp. *thăngkt.* THANKFUL, a. *thăngk'fûl,* grateful; impressed with a sense of kindness received. THANK'FULLY, ad. *-lĭ.* THANK'FULNESS, n. *-nĕs,* state of being thankful; gratitude. THANK'LESS, a. *-lĕs,* ungrateful; unthankful. THANK'LESSLY, ad. *-lĭ.* THANK'LESSNESS, n. *-nĕs,* the state of being thankless; ingratitude. THANKS'GIVER, n. one who gives thanks in acknowledgment of goodness or kindness. THANKS'GIVING, n. [*thanks* and *giving*]: the act of rendering thanks, or of expressing gratitude, for favors or mercies; a public celebration of divine goodness: ADJ. applied to a day set apart for religious services in acknowledgment of the divine goodness. THANK-OFFERING, or THANKS-OFFERING, an offering made, or gift bestowed, in acknowledgment of the divine goodness. THANK'WORTHY, a. deserving thanks; meritorious. THANK'WORTHINESS, n. the state of being thankworthy.

THANKS'GIVING DAY: religious and social festival, observed annually in the United States, on appointment by the president and by state governors. On extraordinary occasions such a day has been appointed in other countries, and such was its origin in this country, as after the first harvest in the Plymouth colony (1621), when

Governor Bradford sent out men to get wild fowl to help the feast; also in gratitude for rain after drouth 1623, and for supplies of sorely-needed food received by ship 1632—all in the same colony; on later occasions, the form of proclamation in 1680 indicated that the feast had become an annual observance. From the documentary history of the second and successful colony of Massachusetts Bay, it seems that such a day was annual with little interruption from 1632, three years after the settlement. In the New Netherlands (New York) a feast of the kind is on record repeatedly from the sixth year of Gov. Kieft, 1644, to the last year of Gov. Stuyvesant, 1664; and under the English governors in 1755 and 60. It was recommended annually by congress during the revolution; but there was an intermission after that, perhaps due to a prevalence of deism and skepticism, until 1789, when President Washington appointed a day of thanksgiving for the adoption of the federal constitution. Subsequently various days in November were recommended by presidents and governors until, in the third year of the civil war, under President Lincoln, the regular observance of a national thanksgiving began; the proclamation by the president being supplemented generally by governors of states, and fixing by custom the last Thursday in November as the day. The absence of calendar church festivals among most of the Protestant communions has favored the day, which has been observed especially by New England independent churches, and which was formerly, if not now, depreciated correspondingly by those who respect church days. As a family gathering and harvest festival, the custom is endeared to multitudes especially. But the religious observance has deplorably fallen into disregard, except as the day has been made an occasion for the minister to speak his mind on political and other secular topics. Neighboring churches now often unite in holding the service.

THAP'SIA: a genus of umbelliferous plants, either perennial or biennial. The decompound leaves are doubly or trebly pinnatifid, the flowers are small, yellow, white, and purple, in many-rayed compound umbels, without involucre, and often without the small-bracted involucels. The most important *Thapsia* is the deadly carrot (*T. garganica*), supposed to have been the source of the gummy accretion called 'asadulcis' by the ancients, and esteemed by them as a drug. A resin is obtained by evaporating the tincture, and the amber-colored resin produced in Algeria is called bon-nafa. Thapsia was formerly employed as an acrid counter-irritant in plasters, for rheumatic and similar pains. *T. decipiens* is the black parsley of Madeira, with a thick umbrella, or palm-like, crown of finely-cut foliage three or four feet across. *T.* (*Monizia*) *edulis* is the carrot-tree, a woody plant, found on uninhabited islands near Madeira, the roots of which are sometimes eaten by visitors to the rocks.

THARMS. See THERMS.

THASOS, *thâ'sos:* most northerly island in the Ægean Sea, a few miles off the coast of Macedonia; circumference about 40 miles. Thasos is mountainous, and, on the whole, barren, and overspread with wild wood. It exports oil, honey, and timber. In ancient times the island was famous for its gold mines, which appear to have been worked from a very remote antiquity. Pop. about 10,000.

THAT, a. and pron. *thăt,* plu. THOSE, *thōz* [AS. *thæt,* the, that: Goth. *thata,* that: Skr. *tat,* it, that]: not this, but the other; the more distant thing in space or time, being thus opposed to *this—this* denoting the nearer, and *that* the more distant of the two objects; pointing to some person or thing mentioned before: the word is used also absolutely or without a noun, as, can you stand *that?* and in certain cases as REL. PRON. instead of *who, which,* and *whom:* in this use *that* is never preceded by a preposition, which, however, may be placed at the end of the clause—e.g., 'the man *of whom* I spoke' would with *that* be 'the man *that* I spoke *of':* CONJ. introduces a reason, object, the final end, or purpose; because. TO THE END THAT, IN ORDER THAT, conjunctional phrases, introducing a reason or purpose, sometimes a result. IN THAT, for the reason that; because.

THATCH, n. *thăch* [AS. *thæc,* thatch; *theccan,* to cover, to conceal: Dan. *tække,* to cover: Dut. *dak,* a roof: Gael. *teach* and *tigh,* a house, a home: L. *tectum,* a roof; *tegĕrĕ,* to cover]: a roof or covering of straw or some similar substance, small sheaves of which are laid side by side so as to shed the rain, and fastened down with pins and ropes: V. to cover or roof with straw, reeds, or similar substances. THATCH'ING, imp.: N. the act of covering buildings with thatch; materials such as straw or reeds used for covering buildings. THATCHED, pp. *thăcht:* ADJ. covered with thatch. THATCH'ER, n. *-ẽr,* one who thatches houses.

THATCHER, *thăch'ẽr,* HENRY KNOX: 1806, May 26—1880, Apr. 5; b. Thomaston, Me.: naval officer. He entered the U. S. navy as midshipman 1823; was promoted lieut. 1833, commander 1855, commodore 1862, and rear-admiral 1866; and was retired 1868, May 26. Returning from the Mediterranean station 1863, July, he commanded the 1st div. of Com. Porter's fleet in both attacks on Fort Fisher; and soon afterward succeeded Admiral Farragut as commander of the w. Gulf squadron at Mobile. He there co-operated effectively with the army under Gen. Canby, bombarded Fort Alexis and Spanish Fort prior to their successful storming by the army, and thus aided in forcing the surrender of Mobile and of the Confederate fleet, which he pursued up the Tombigbee river. After his retirement he was port-admiral at Portsmouth, N. H.

THATCHER, OLIVER JOSEPH, PH.D.: American historical writer: b. Wilmington, Ohio. He was graduated

from Wilmington College in 1878, and was instructor of ecclesiastical history at the United Presybterian Theological Seminary 1888-90 and professor there 1890-2. In 1893 he became assistant and in 1896 associate professor of mediæval and English history in the University of Chicago. He has published *A Sketch of the History of the Apostolic Church* (1894); *A Short History of Mediæval Europe* (1897); *A General History of Europe* (1900), with F. Schwill; *Studies Concerning Adrian IV.* (1903); *A Source-Book of Mediæval History,* with E. H. McNeal (1905); etc.

THATCH-WOOD WORK: in *hydr. engin.,* mode of facing sea-walls with brushwood. Underbrush of from 12 or 14 years' growth is cut down, fagoted at its full length, and spread over the face of the banks. It is kept down by strong stakes, which have cross-pins at their upper ends to rest on the brush, which breaks and disperses the waves and protects the earth beneath.

THAU. See AMBOYNA.

THAUMATROPE, n. *thaw'mă-trōp* [Gr. *thauma,* a wonder; *trepō,* I turn]: optical instrument or toy for showing the persistence of an impression on the eye after the luminous object has been withdrawn. See STEREOSCOPE; ZOETROPE.

THAUMATURGY, n. *thaw'mă-tėr'jĭ* [Gr. *thauma,* a wonder; *thaumata,* wonders, *ergon,* a work]: the performing of wonders; magic. THAU'MATUR'GIC, a. *-jĭk,* or THAU'MATUR'GICAL, a. *-jĭ-kăl,* exciting wonder; wonder-working. THAU'MATUR'GIST, n. *-jĭst,* one who works wonders; one who deals or believes in wonders. THAU'MATUR'GUS, n. *-gŭs,* a wonder-worker; a miracle-worker.

THAW, n. *thaw* [Dut. *dooi,* thaw: Ger. *thauen,* to thaw. OHG. *dawjan;* Ger. *verdauen,* to digest: W. *tawdd,* melting, dripping: Icel. *thida,* to thaw]: the melting of ice or snow by a change of temperature; the change of weather that causes it: V. to melt or reduce to a liquid state, as ice or snow; to become sufficiently warm to melt ice or snow, as the weather. THAW'ING, imp.: ADJ. dissolving; melting. THAWED, pp. *thawd.* THAWY, a. *thaw'ĭ,* growing liquid; inclined to thaw.

THAXTER, *thăks'tėr,* CELIA (LEIGHTON): poet: b. Portsmouth, N. H., 1836, June 29; d. 1894, Aug. 26. She spent the most of her life at Appledore, Isles of Shoals, whither her family removed when she was a child, and where she was married to Levi L. Thaxter, 1851. Her publications include: *Among the Isles of Shoals* (Boston 1873); *Poems* (1874); *Driftweed* (1878); *Poems for Children* (1884); and *The Cruise of the Mystery, and Other Poems.*

THAYER, *thär,* ELI: educator: b. Mendon, Mass., 1819, June 11; d. 1899, Apr. 15. He graduated at Brown Univ. 1845; became principal of Worcester Academy, and 1848 founded at Worcester the collegiate

school for young ladies. While representative in the state legislature 1853-4, he organized the Emigrant Aid Company to settle the new state of Kansas with anti-slavery colonists, and labored with ardent zeal for the free-state cause till 1857, when he was elected to congress from Massachusetts, serving two terms. Thayer's work in Kansas was of far-reaching effect on the anti-slavery struggle and on its great national issue.—Thayer invented a hydraulic elevator, a sectional safety steam-boiler, an automatic boiler-cleaner, etc.

THAYER, JOSEPH HENRY: Greek scholar: b. Boston, 1828, Nov. 7; d. 1901, Nov. 26. He graduated at Harvard 1850 and Andover Theological Seminary 1857, was pastor of a Congregational church in Salem 1859-64, professor of sacred lit. in Andover Theological Seminary 1864-84, and afterward became professor of New Test. criticism and interpretation in Harvard Divinity School and also secretary of the American committee on Bible revision. He served a year as chaplain in the civil war. Besides many occasional papers, he translated and edited Winer's *Grammar of the Idioms of the N. Test.* (1869); Buttmann's *Grammar of N. Test. Greek;* Grimm's Wilke's *Greek-English Lexicon of the N. Test.;* edited Abbot's *Notes on Scrivener's Plain Introduction to the Criticism of the N. Test.;* and contributed to the Amer. edition of Smith's Bible Dictionary.

THAYER, SIMEON: 1737, Apr. 30—1800, Oct. 14; b. Mendon, Mass.: military officer. In early life he removed to Rhode Island, with whose troops he served in the French war 1756, and with Robert Rogers's rangers afterward, and was taken prisoner at Fort William Henry 1757. He was a captain in Arnold's expedition to Quebec, where he was again taken prisoner; was promoted major 1777; distinguished himself in the defense of Red Bank and at Fort Mifflin, for which the Rhode Island legislature gave him a sword; was wounded at Monmouth 1778, and was retired 1781. He prepared a *Journal of the Invasion of Canada in 1775.*

THAYER, SYLVANUS, LL.D.: 1785, June 9—1872, Sep. 7; b. Braintree, Mass.: military officer. He graduated at Dartmouth College 1807 and at the U. S. Military Academy 1808, entered the engineer corps of the U. S. army; was promoted 1st lieutenant 1812; chief engineer on the Niagara frontier under Gen. Dearborn 1812-3, and on Lake Champlain 1813; promoted captain 1813; engineer in the defense of Norfolk 1814; and promoted major 1815. He was superintendent of the U. S. Military Academy 1817-33; engineer in charge of construction of defenses in and about Boston harbor 1838-68; and was retired with rank of brevet brigadier general 1863, June 1. He bequeathed $300,000 to endow an academy, and $32,000 to found a public library in Braintree, and $70,000 to establish a school of architecture and civil engineering at Dartmouth College.

THE, a. *thĕ* or *thē* [AS. *se* or *the;* Dut. *de;* Ger. *der,* the]: a word placed before nouns, or nouns preceded by adjectives, to point them out and limit their signification; usually called the *definite article,* but is really a demonstrative adjective, and only a softened form of *that;* used before adjectives in the comparative and superlative degrees.

THE'A: genus to which the tea-plant belongs: see TEA.

THEANDRIC, a. *thē-ăn'drĭk* [Gr. *theandrikos*—from *theos,* God; *anēr, andros,* a man]: relating to our existing by the joint agency of the divine and human natures in Jesus Christ. THEANTHROP'IC, a., or THEANTHROP'ICAL, a. [Gr. *theos,* God; *anthrōpos,* a man]: partaking of both the divine and the human nature. THEAN'THROPISM, n. state of being both God and man. In general, a conception of God or of gods as possessing qualities essentially the same as those of men, but on a grander scale. THEAN'THROPIST, n. one who advocates or believes in Theanthropism.

THEATINES, *thē'a-tĭnz:* one of the more modern religious brotherhoods of the Rom. Cath. Church, which took an important part in the movement in central and southern Italy for reformation toward the middle of the 16th century, described in Ranke's *History of the Popes.* The founders of the assoc. of Theatines were a party of friends: Cajetan di Thiene; John Peter Caraffa, at that time bp. of *Theate* (whence the name Theatines); Paul Consiglieri; and Bonifazio di Colle. They resigned all their preferments, and obtained a brief of Pope Clement, 1524, formally constituting the new brotherhood, with the three usual vows, and with the privilege of electing their superior, to hold office for three years. Their vow of poverty had the peculiarity that they were forbidden to possess property, and were to subsist entirely on the alms of the faithful; and yet were strictly forbidden in any way to solicit charitable contributions. Their first convent was opened in Rome, and F. Caraffa was chosen as the first superior: he was succeeded 1527 by Cajetan, and the Congregation began to extend to the provinces. After a time it was thought advisable to unite it with the analogous order of the Somaschans; but this union did not continue; Caraffa, who was elected pope, under the name Paul IV., having restored the original constitution 1555. By degrees, the Theatines extended themselves, first over Italy, afterward into Spain, Poland, and Germany, especially Bavaria. They did not find entrance into France till the following century, when a house was founded in Paris under Cardinal Mazarin 1644. To their activity, devotedness, and zeal, Ranke ascribes much of the success of the remarkable reaction against Protestantism in the latter half of the 16th century. At present the Theatine order is confined to Italy and Sicily.

THEATRE, or THEATER, n. *thē'ă-tėr* [F. *théâtre*—from L. *thĕātrum;* Gr. *thĕātron,* a theatre—from Gr. *thĕāŏmai,* I see; *thea,* a view]: a building in which to exhibit dramatic performances or shows; a play-house; a building or room with a platform at one end, and rows of seats rising up gradually like the seats of an ancient theatre, one behind the other; large apartment suitably arranged for lectures, anatomical demonstrations, etc.; any field or place of action or exhibition, as the *theatre* of war. THEATRIC, a. *thē-ăt'rĭk,* or THEAT'RICAL, a. *-rĭ-kăl,* pert. to a theatre or dramatic representation; resembling the manner of dramatic performers; pompous; calculated for display; artificial. THEAT'RICALLY, ad. *-lĭ.* THEAT'RICALS, n. plu. *-kălz,* dramatic performances.—A *Theatre* is a place for public representations, chiefly dramatic or musical. Theatres are of very ancient origin. They were found in every Greek city, both at home and in the colonies, and many interesting specimens of the Greek theatres still remain in good preservation. These were not like modern theatres, with tiers of galleries rising one over the other, but were built with concentric rows of seats rising in regular succession one behind and above another like steps. These seats were frequently cut in the solid rock; and a place where the natural curve and slope of the ground rendered such excavation easy was generally chosen. The seats, or audience department, were arranged in semicircular form. In the centre, stood the orchestra upon which, in Greek theatres, the performance took place. In Roman theatres the stage [or place for the dramatic representation] formed the chord of the semicircular auditorium. Behind this was the scena, closing in the building with a solid wall, generally ornamented with pillars, cornices, etc. There was no roof, but the audience was probably protected from the sun's rays by a curtain stretching across the theatre. This form of T. was also that adopted by the Romans, who built or excavated large theatres in many of their important towns. The theatres of the Romans differed from their *Amphitheatres* (q.v.), the former being semicircular, the latter oval, with seats all round. Of the theatres still remaining, that of Orange, in s. France, is one of the finest, the auditorium being 340 ft. in diameter. The illustration (fig. 1) shows the general form of these ancient theatres; and in this case the scena is more elaborate than usual. During the middle ages, theatres were unnecessary, and were never built. The few dramatic performances then in use, chiefly of the nature of sacred mysteries, were represented in the cathedrals (see MYSTERIES AND MIRACLE PLAYS). From the remains still visible, however, there seem to have been large open-air theatres at an early age in Britain. Of these, Piran Round in Cornwall is the best example: it is circular, with raised platforms all round for spectators, after the manner of the Greek theatres.

With the revival of classical literature in the 16th c., the classical drama also was reproduced, and naturally with it the classical form of T. The first specimens of what may be called modern theatres (though founded on the old Greek model, according to Vitruvius's description) were the Theatro Olympico, erected by Palladio in Vicenza; a similar one in Venice, also by Palladio: and another in Vicenza, by Serlio. In Spain, possibly in Italy also, open court-yards, with galleries, were at first the scenes of dramatic perform-

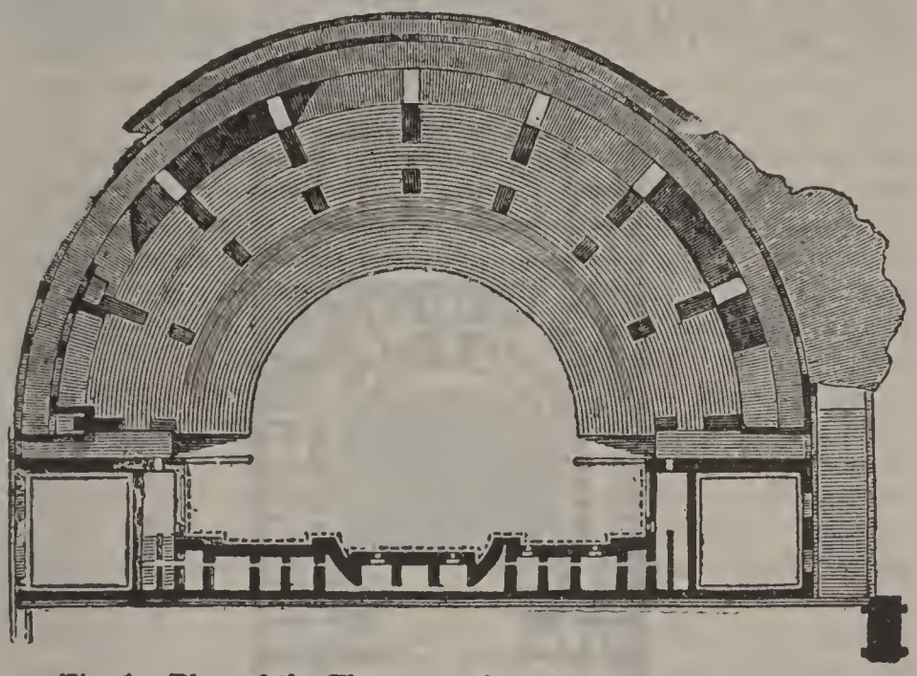

Fig. 1.—Plan of the Theatre at Orange. (From Fergusson.)

ances. In France the first plays performed were exhibited in tennis or racket courts, in which there were usually galleries at one end; and as this accommodation was too limited, the galleries were afterward carried along the sides also. The English theatre had its beginnings in the rude presentations of Inn court-yards. But dramatic literature soon became so important that buildings had to be designed expressly for its representation. In Paris, the T. of the Hôtel de Bourgogne was erected in the beginning of the 17th c. and rebuilt 1645, with tiers of boxes on a square plan. In 1639 the T. of the Palais Royal was erected by Richelieu, and long considered the best model. The present circular plan of the galleries, with pit sloping backward, seems to have been introduced in Venice 1639; and the horseshoe form of the boxes was carried out first by Fontana in the Tordinoni Theatre, Rome, 1675. The modern form of the auditorium was thus invented, and gradually improved and perfected, till in about a century similar theatres were erected all over Europe; the Scala T. at Milan, largest in Italy (1774), and the great T. at Bordeaux (1777). The annexed plan of the Scala T. at Milan (fig. 2) will show the general disposition of all the parts of the modern T. on the

largest scale. Modern theatres all are similar in general distribution. They are divided into two distinct departments—the auditorium or audience department, and the stage or scenic department. In the former, the seats are invariably arranged on a sloping ground-floor and on several tiers of galleries, extending in semi-circular or horseshoe form round the house. In England on the ground-floor, the front rows of seats are generally set apart as 'dress stalls,' and the back part is then called the 'pit.' In opera-houses, the stalls generally occupy the greater portion of the space, and the 'pit' is reduced to a minimum. In dramatic thea-

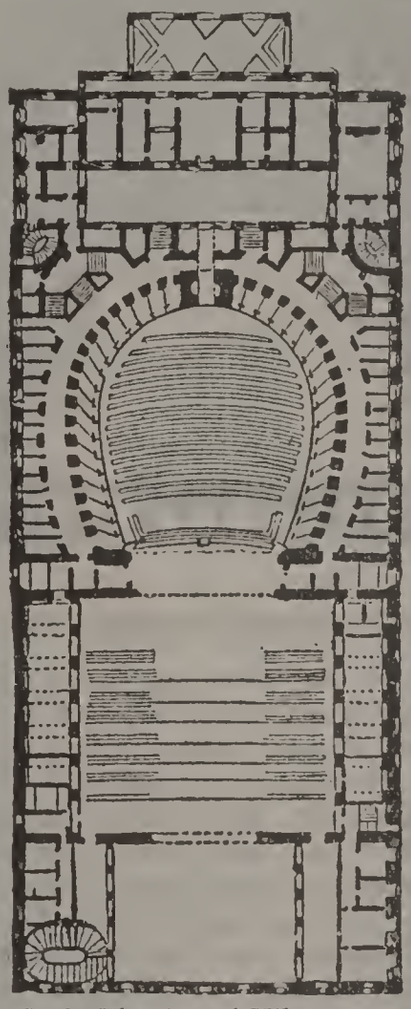

Fig. 2—Plan of La Scala Theatre at Milan—scale, 100 feet = 1 inch
(From Fergusson.)

tres, the tiers of galleries have the floors arranged in stages, rising one above another in such manner as to enable all spectators to see over those before them to the front of the stage. In theatres for operatic representation, the galleries have the floors level, and are divided all round into private boxes. The top tier is, however, sometimes left partially open for seats. In the larger opera-houses, there are usually retiring-rooms connected with each of the private boxes. There is also a 'crush-room,' or large saloon, in which the assembly may promenade between the acts. In some French theatres and opera-houses, these saloons, or

foyers, are very large, and elegantly fitted up. They are almost always over the entrance-hall. In some modern French theatres there are two foyers, one over the other, for the different classes who occupy the dress-circle and the upper galleries. The question has often been raised as to the best form for a T., both for hearing and seeing. It is a difficult question to decide theoretically as regards hearing, but it is quite clear that the old semicircular plan of the Greeks is as nearly as possible the best for seeing, as it places the seats all round at equal distance from the centre of the proscenium; therefore this old form is usual in cases where seeing well is all-important. Theatres are now built on more scientific principles, both with regard to acoustics, seeing, ventilation, and provision of entrance and exit arrangements with regard to the safety and comfort of patrons. Accidents by fire and panic crushes have gradually brought about proper safeguards against accident, and an asbestos curtain as well as better staircase provision and fireproof arrangements in building are now obligatory. The 'Auditorium' in Chicago and the 'Hippodrome' in New York are two examples of proper adaptation of seating to view the stage capacity—for spectacles on an enormous scale. There is also fitting attention given to size of theatres relative to the grade of performances to be held therein, and for the best class of intellectual and potic drama theatres of comparatively small size are given the preference as the only sort affording opportunity for appreciation of subtleness of acting and full grasp of the spoken lines. For melodrama and for opera—as for spectacle—the large theatres are usual.

The orchestra occupies the space immediately in front of the proscenium, and this space is arranged so as to be capable of being enlarged or contracted as occasion may require. The proscenium was formerly a small portion of the stage projecting a few feet in front of the curtain to bring the actors farther forward but the stage is now cut almost to the curtain. The part of the house on either side of the proscenium is that on which there is usually the greatest amount of ornament. The sides and ceiling of the proscenium form, as it were, the frame through which the picture represented on the stage is seen; and as on it every eye must rest, it is made more ornate than the rest of the auditorium. The ceiling presenting a broad surface and being well seen from many parts of the house, is also adapted for ornament, and is generally made as handsome as possible, as are likewise the fronts of the first balcony and galleries. The stage extends backward from the proscenium, and ought to be of considerable depth, to admit of scenic effects, dissolving scenes, etc. The great length of the stage from front to back is one of the most striking differences between the modern and the ancient T., and arises from

th introduction and development of movable scenery—an invention of the architect Baldassare Peruzzi, and first used in Rome before Leo X., 1508. The floor of the stage is not always level like the floor of a room, but is sometimes sloped upward from front to back to elevate the performers and scenes at the back, and render them more easily seen. The inclination of the stage is generally about half an inch to every foot. The stage department of a T. must be not very long, but also very lofty above, and deep below the stage, so as to allow the large frames on which the scenes are stretched to be raised or lowered in one piece. The stage itself is a complicated piece of mechanism, a considerable part of it being made movable either in the form of traps, for raising or lowering actors, furniture, etc., or in long pieces, which slide off to each side from the centre, to allow the scenes to rise or descend. There are also bridges, or platforms, constructed for raising and lowering through similar openings, some of them the full width of the stage. The traps and bridges are usually worked by means of balance-weights, and the slides by ropes and windlasses. Besides the large frames above described as containing pictures occupying the full opening of the stage, there are other scenes which are dropped from the 'flies' above when a change of background is needful. Some of these drops are gauze, to cause illusions of light, or variety of chiarocuro, and assist greatly in much of our modern scenic effects, which are frequently of notable beauty. Transformation scenes, and the changing of the light through supposedly progressive hours of day or night are accomplished with especial effectiveness by means of these gauze curtains painted—or not—used in conjunction with clever handling of the electric lighting of the scenes.

The old fashioned flats with their cumbersome grooves are now replaced by narrow openings or slits in the stage, below which are blocks running on wheels, and containing sockets, into which poles are dropped from above, and to these the flats—or pieces pushed on from the sides,—are attached. Nowadays therefore when occasion requires the whole stage can be entirely cleared, while according to the old plan of fixed grooves, only the centre of the stage could be cleared without unscrewing all the grooves. The scenes, which are drawn up, are worked by means of ropes from the flies, or galleries running along the sides of the stage at a high level. The ropes from these pass up into the barrel-loft (a space in the roof filled with large drums and barrels on which the ropes are coiled) and down again to the flies. The scene sets for interiors now consist of sides and back portions resembling actual interiors, and in such sets the old fashioned wings with intervening entrances are therefore now no longer employed. Many realistic devices are nowadays introduced into our stage effects especially in spectacle and melodrama, a com-

paratively new one being the clever employment of the vitagraph to represent moving objects in the distance—approaching railway trains, and so forth, while the older devices of 'real water' scenes—race course tread mill scenes, and so forth—are also common. In connection with the stage, it is usual to have a large space set apart for containing scenery, called the *scene-dock*. This is frequently placed at the back of the stage, and may, on occasion, be cleared out, to give extra depth to the scene. There are also numerous apartments required in connection with the stage for the working of the T.—such as manager's room; dressing-rooms for actors and actresses; the 'green-room,' in which they assemble when dressed, and wait till they are called; 'star rooms,' or dressing-rooms for the stars; the wardrobe, in which the costumes are kept; furniture-stores; scene-stores; 'property'-maker's room; and workshops for the carpenter, gas-man, etc. There must be also a good painting-room, which must necessarily be a large apartment, from the size of the pictures which have to be painted—each being the full size of the opening of the stage. The canvass for these scenes is stretched on frames, which move up and down by means of a winch with balance-weights; and thus the painter stands comfortably on the floor, and moves his picture up or down, so as to get at any part he wishes. An interesting point on the stage is the prompt corner (on the right of the stage, but left of the spectators) from which the prompter has command of the switchboard for all the lights of the house, and of the bells to warn every man of his duty at the proper moment. The side of the house on which the prompter is seated is called the prompt side,' and the other side is called the 'O. P.' or *opposite* side.

The house, or auditorium department, is generally lighted by means of a large lustre or sun-light in the centre of the ceiling: and much of the effect of the building depends on how this is managed. There are also usually smaller lights round at least one tier of the boxes. The proscenium is lighted by a large lustre on each side, and by the foot-lights, along the whole front of the stage. These are sometimes provided with glasses of different colors, called mediums, used for throwing a red, green, or white light on the stage. The stage is lighted by rows of incandescent burners up each side and across the top at every entrance. All of these, with all lights behind the scenes are wired to the prompt corner. There is also provision for carrying insulated wires and light stands to the several entrances for temporary lights and to produce a bright effect wherever required. Another means of producing brilliant effects of light is the lime-light, by which, with lenses of colored glass, bright lights of any color can be thrown on the stage or scenery when required.

Even now with all our modern methods of heating and ventilation theatres are often either very cold or

insufferably hot. The centre lustre is the great cause of ventilation, the draught caused by its heat drawing off the foul air at the ceiling. The suction caused by this withdrawal of air is naturally supplied from the great body of air in the stage. The stage is, therefore, heated by means of steam or hot-water radiators or otherwise. The passages and lobbies round the house are heated in the same way, so that any air drawn into the house is properly tempered. An attempt has been made in Paris to obviate the great heat and draught caused by the centre lustre, by dispensing with it, and making the ceiling partly of glass, with powerful lights and reflectors behind the glass in the roof. This mode of lighting is of rather a subdued character for a T., though very appropriate to legislative chambers. The T. built at Baireuth 1876 for Wagner, and designed to carry out his views as to dramatic representation, has various devices for heightening the dramatic illusion; the orchestra, e.g., being beneath the level of the stage, and wholly invisible to the spectators.

There is a class of theatres in Germany which have a double auditorium, one at each end of the stage. One of these is arranged and lighted in the usual manner, and is called the Winter T. The other is called the Summer T., and is arranged for performances in daylight during the summer: it is lighted by large windows in the outer wall, which corresponds in form to the interior curves of the galleries; also by windows in the roof.

The new Grand Opera of Paris, opened 1875, is admittedly the finest T. in the world; it was built by government at a cost of more than 36,000,000 of francs (about $7,200,000). Its auditorium is, however, seated for only 2,200 persons. (On the Théatre Francais and its constitution, see COMEDIE FRANCAISE.)

The art of *dramatic representation* has undergone great changes. In ancient Greece, partly from the character of the subjects selected, partly from the origin of the drama itself, costume and acting were conventional, artificial, and stereotyped. On this point, we quote Witzschel's handbook (transl.): 'There can be no doubt that the somewhat fantastic costume which was handed down without any change from one generation of actors to another was closely connected with the religious character of their tragic performances. The peculiar fashion and brilliant colors of the tragic wardrobe belonged rather to the Dionysian solemnities than to the stage. That Æschylus, by whom the greater part of it was invented, kept steadily in view the original intention of tragedy, is evident from the notices which we find in ancient writers of his theatrical dresses having been worn in other religious ceremonies and processions. It is only reasonable to suppose that he would have given to the tragic stage a wardrobe of a very different description had he not been influenced by the

conviction that theatrical performances were in some sort a religious ceremonial. Another proof of the general feeling on this subject is found in the ridicule with which Aristophanes overwhelms Euripides for introducing his heroes not only in pitiable situations, but in dirty, ragged, and beggarly weeds, to the great disgust of all true-hearted Athenians, and the utter annihilation of tragic ideality. In the *Acharnenses*, the whole of the tragic poet's squalid wardrobe is held up to public derision.

'The tragic costume for male characters of the highest rank consisted of an embroidered tunic with sleeves, which in the older personages reached to the feet (*chiton poderes*), and in the younger to the knees. Over this was thrown a green pall, or long mantle (Gr. *surma*, L. *palla*), which also reached to the feet, and was richly ornamented with a purple and gold border. Persons of high but not royal rank wore a shorter red mantle, embroidered with gold, which was partially covered by a richly embroidered, high-fitting scarf. Soothsayers wore over the tunic a kind of network, composed of woolen threads. A sort of waistcoat (*kolpōma*) was also worn over the tunic. This was the costume of powerful and warlike sovereigns, such as Atreus, Agamemnon, etc. Dionysus (Bacchus) appeared in a purple tunic, which hung negligently from an embroidered shoulder-knot, and in a thin, transparent, saffron-colored upper robe, with a thyrsus in his hand. Even Hercules himself was not the athletic hero of the old mythology, with a lion's skin thrown loosely round his muscular limbs, but a solemn, theatrical personage, enveloped in a long mantle. The custome of a queen was a flowing purple robe, with a white scarf; and for mourning, a black robe and blue or dark yellow shawl. Persons in distress, especially exiles, wore dirty-white, dark-grey, dingy-yellow, or bluish garments. . . . To increase their height, the tragic performers wore the cothurnus, a sort of buskin, with high soles and still higher heels, which compelled them to walk with a measured and sounding tread, and a top-knot of hair, or toupet (Gr. *ongkos*), suitable to the age and condition of the character represented. A corresponding breadth of figure was produced by means of padding and by a sort of glove. Thus equipped, the tragic hero seemed a giant as compared with ordinary mortals. Lastly, they had the mask, a part of the ancient theatrical costume, which seems to us strange and unnatural. For its meaning and origin, we must go back to the Dionysian festival, at which the excited crowd were wont, in honor of the jolly god, to smear their faces with lees of wine—and at a later period, when dramatic interludes were attempted, with vermillion—or to cover their cheeks with rude masks of bark. In the course of time, these primitive inventions were discarded, and their place supplied by linen masks, characteristically

painted. For the sake of retaining this uncouth but distinctive appendage of the Dionysian festival, the Greeks were content to forego the delicate expression of feeling and eloquent play of features indispensable to a modern actor; but on the other hand, when we remember the enormous size of their theatres, which scarcely permitted the assembled thousands to hear what was said by the actors, still less to distinguish their features, we are forced to acknowledge that the practice of wearing masks was rather an advantage than an inconvenience.' The above description is, in the main, applicable to the Roman as well as the Greek theatres. The only additional point which it is necessary to notice is that, among the ancients, the acting of plays was not (as it is now) a regular and daily, but only an occasional affair, at festival seasons and the like. With the fall of the Western Empire, the disappearance of classic paganism and classic tastes, and the triumph of the Christianized barbarians of the north and east, theatrical performances ceased. But the liking for such things is not artificial: it is natural and irrepressible; and gradually, as the ancient culture resumed something of its former sway, efforts were made, not, indeed, to re-enact the majestic tragedy of Greece (for its language was scarcely known), or the pungent comedy of Rome, but to throw into dramatic form the 'mysteries,' 'miracles,' and 'moralities' of the Christian religion. The rudeness of these mediæval plays may perhaps suggest to us what Greek performances were before the days of Thespis. In fact, they were introduced as a means of edifying as much as of amusing the ignorant laity, were customarily the work of monks, and were performed on festive occasions in the churches. A raised wooden stage like that which forms the front of a travelling show was all that the untutored taste of the times demanded. Nor are we to suppose that the slighest attention was paid to propriety of custome or speech. The personages rather than the actions, the ceremony rather than the dialogue, the moral rather than the matter, were the things looked to: hence no subtle or artistic representation of life and character was possible. See MYSTERIES AND MIRACLE-PLAYS. The development of the modern Drama (q.v.) ultimately restored the art of the actor to its ancient dignity and importance; but it was long before those changes took place that gave theatrical performances their modern character. Good acting—i.e., skilful impersonation of character and varied elocution—became quite common in England after the Restoration, and was not unknown before it; but appropriate costume and scenery were scarcely thought of until the time of Talma (q.v.), toward the close of the 18th c. Since then, the best theatres have displayed a creditable desire to reproduce, with something of verisimilitude, the outward 'form and pressure,' the garb, deportment, and air of the age represented.

Female actors were popular in Spain very early, and in France their employment dates from the first half of the 17th c.; but they were not permitted (without molestation) to tread the English stage till 1661. Before this innovation, female parts were performed by youths; and though it ill consorts with *our* ideas of adequate representation to conceive the parts of Desdemona, Ophelia, Cordelia, etc., executed by those of another sex, several actors appear to have obtained wonderful success in this line.

The title of 'His Majesty's Servants,' which English actors once bore, originated in the fact that some of them were really members of the royal household. The king and particular nobles kept troupes of actors for their own pleasure, whom they sometimes permitted to go about the country and perform. The first prince of whom we read as giving 'servants' such permission was Richard, Duke of Gloucester (afterward Richard III). In Queen Elizabeth's time (1571), the Earl of Leicester's 'servants' were licensed to open the first *public* T. in England, and it is owing to the fact that actors originally formed part of the household of the king that in Great Britain a license from the lord chamberlain is still necessary to the opening of a theatre.—See DRAMA.—For an anecdotical and amusing history of the English stage, see *Their Majesties' Servants*, by Dr. Doran (1865); also Dutton Cook's *Book of the Play* (1876). See also Mantzius *History of Phoctorical Art;* Haight, *Attic Theater;* J. Brander Matthews *Development of the Drama.*

LAWS AS TO THEATRES.—In the United States, no general law, federal or state, governs the conduct of theatres as distinguished from other places of assembly for amusement, instruction, or social intercourse. The local municipal authorities usually require theatres to be licensed and to pay a tax. Except in cases of flagrant scandal, the police power does not interfere in the management of theatres. There is no public censorship of theatrical compositions. But the local authority that grants the license may withdraw it in case a play is billed which is deemed offensive, or on any account objectionable; and the theatre manager has no remedy at law. The mayor of New York by refusing a license prevented (about 1880) the enacting of a 'passion play.' In New York City the Soc. for Prevention of Cruelty to Children prohibits the employment of young children on the stage and in giving miscellaneous exhibitions. Similar methods of indirect control of theatres are employed in other cities.

THEBAINE, n. *thē-bā'ĭn:* a pain-allaying but not soporific alkaloid of opium; called also *Thebaia:* see OPIUM.

THEBAN, a *thē'băn:* of or from *Thebes*, in Egypt: N. a native or inhabitant of Thebes. THEBAN YEAR, the anc. Egyptian year of 365 days 6 hours.

THEBES.

THEBES, *thēbz:* celebrated Egyptian city, called by the Egyptians Taape, or Taouab; by the Hebrews, No-Amen; by the Greeks, Thebæ; and at a later period, Diospolis Magna; formerly capital of s. Egypt. Its ruins, in the broadest section of the valley of the Nile, about lat. 26° n., are the most extensive in Egypt, and comprise nine townships, the most remarkable of which are Medinat Habu, Gournah, Karnak, and Luxor. Its local and eponymous god was Amen-Ra, or Jupiter Ammon; and its foundation traditionally dated from the time of Menes, founder of the monarchy, though no remains of so early a date have been discovered on the site. Recent excavations have brought to light constructions of the 11th dynasty, whose kings appear to have founded the original temple of the god. The Nile flows through the midst of the ancient city, dividing it into four principal quarters: Karnak and Luxor on the e. bank, and Gournah and Medinat Habu on the w. bank. The most flourishing period of the city was under the 18th, 19th, and 20th dynasties, about B.C. 1500-1000, when it had supplanted Memphis, ancient capital of the Pharaohs. The more central situation of this city probably caused it to rise into importance, for it was secure against the northern enemies of Egypt; hence, under these Diospolitan dynasties, the worship of Amen-Ra rose to all its splendor: magnificent palaces and temples were built in the different quarters, to which additions were made by later monarchs, and even by the Ptolemies and Romans till the time of the Antonines, in the 2d century after Christ. Here, too, were the cemeteries of the Theban monarchs and of the officers of their courts, colleges of priests, and the seat of royal government. It was enriched by the spoils of Asia and the tributes of Ethiopia, and its fame had reached the early Greeks, Homer describing it by the epithet Hekatompylos, or City of a Hundred Gates, in allusion to its propylæa, for Thebes was never a fortified city. In the plentitude of its power, it sent forth an army of 20,000 war-chariots; but the Bubastite and Tanite dynasties removed the capital again to Sais and Memphis, and Thebes declined in importance, though retaining much of its ancient grandeur. At the Persian conquest, Cambyses obtained a spoil of nearly $10,000,000 from the city, destroyed many of its noblest monuments, and lessened its political pre-eminence. The founding of Alexandria still further injured the city; and at the time of Strabo, Thebes was only a cluster of small villages, about 9½ m. in length (according to Diodorus), and in circuit about 16 m. Its temples, tombs, and ruins were visited by Roman travellers, including Hadrian. At a later period a considerable Christian population existed under the empire; but the inhabitants fled at the Arab invasion to Esneh; and Thebes is now inhabited by only a few Arab families of Fellahin, who obtain

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precarious livelihood by guiding travellers over the ruins, or rifling the tombs for antiquities. At Gournah is seen the Memnoneion, built by Rameses II.; with a colossus (broken) of that monarch, weighing 887½ tons, the largest statue in Egypt. This is supposed to be the palace of Osymandyas, described by Hecatæus, and is of considerable extent. In this quarter are two palace-temples of Amenophis III., and the vocal Memnon, or celebrated colossus of that monarch, supposed by the ancients to emit a sound at sunrise. At Medina Habu is a pile of buildings, begun by Thothmes I., of the 18th dynasty, with courts and propylæa, built by Rameses III. or Rhampsinitus, and sculptures representing his victories over the Philistines, the life in his harem, the riches of his treasury, and a calendar with inscriptions dated in the 12th year of his reign. Here, 8,000 ft. to the n.w., are the cemeteries of sacred apes; and 3,000 ft. beyond, the valley of the Tombs of the Queens, comprising 17 *syringes,* or sepulchres, supposed to be the tombs of the Pallacides of Amen, mentioned by Diodorus and Strabo. Near them are the Biban-el-Meluk, or tombs of the monarchs of the 19th and 20th dynasties, 16 in number; the most interesting of which are that of Sethos I., called Belzoni's, after its discoverer, and those of Rameses III. and Siptah. At Gournah itself are the tombs of functionaries and others, and this latter site has enriched the museums of Europe with antiquities of various kinds. The palaces of the Luxor quarter were founded by Amenophis III.: hence was removed the obelisk now in the Place de la Concorde in Paris. Still more magnificent than any of these is the temple of Karnak, whose sanctuary, built by Osertesen I., of the 12th dynasty, was enlarged by the monarchs of the 18th dynasty. The most remarkable part of this wonderful mass of courts, propylæa, and obelisks, is the great hall, 170 ft. by 329 ft., built by Sethos I. and Rameses II., having a central avenue of 12 massive columns, 60 ft. high, 12 ft. in diameter; 122 other lofty columns; and 2 obelisks; 92 ft. high. Here is the so-called Portico of the Bubastites, built by Shishak I., recording his expedition against Jerusalem, B.C. 971. An important discovery was made 1881 in a rock-cut gallery in cliffs 4 m. e. of Thebes, including 39 mummies of royal and priestly persons, five perfect papyri, and thousands of mortuary statues and other objects. They may have been hidden here by the priests in the invasion by Cambyses. The mummies belong to personages from the 17th to the 21st dynasties; and among them are those of Thothmes III., who erected the obelisk now on the Thames Embankment, London, and of Rameses II. (q.v.). For various Theban obelisks, see OBELISK.

THEBES: principal city of Bœotia, in ancient Greece, in the s. part of the country, on the slopes of Mount

Teumessus, and between two streams, the Dirce and the Ismenus. According to the prevalent tradition, Thebes was founded by a colony of Phœnicians under Cadmus (q.v.), after whom the city was called Cadmeia—a name subsequently restricted to the citadel; but passing over the long series of picturesque and tragic myths that have given Thebes its prehistoric fame (in which the central figure is Œdipus), we catch the first quasi-authentic glimpse of Theban history in B.C. 8th century, when one Philolaus, a Corinthian, settled in the place, and drew up a code of laws for the inhabitants. Near the end of B.C. 6th century we reach a purely historical period—the earliest well-attested event being the dispute between Thebes and another Bœotian city, Platææ, which involved Thebes in an unsuccessful war with Athens. Thenceforth the relations of Thebes and Athens were, except for brief intervals, marked by bitter enmity. During the Persian war Thebes shamefully sided with the Asiatic invader, and, in consequence, lost much of its power and prestige. Athens proposed to deprive the city of its supremacy over the Bœotian confederacy; but Sparta, always jealous even to spitefulness of her Attic rival, interfered, and forced the other Bœotian cities to acknowledge anew their unworthy mistress. When the Peloponnesian war broke out Thebes took part with Sparta, and at its close was eager for the destruction of Athens; but soon afterward it became jealous of the overgrown power of its ally, and gave friendly shelter to those Athenians whom the oppression of the Thirty Tyrants (q.v.) compelled to abandon their city. From Thebes, Thrasybulus and his co-patriots started on their famous expedition for the deliverance of Athens, accompanied by a body of Theban citizens. A keen and bitter antagonism now sprang up between Thebes and Sparta, which, after many vicissitudes, ended in a great military struggle B.C. 379-362, in which Thebes, under the heroic guidance of Epaminondas (q.v.), achieved a brilliant triumph, and for a time held the position of foremost power in Greece. It was now the time for Athens to revive her ancient animosities; and for a while they had free play. At length the eloquence of Demosthenes induced both states to unite in opposition to the encroachments of Philip of Macedon; but it was too late; and B.C. 338 the battle of Chæroneia crushed the liberties of Greece. After Philip's death, the Thebans made a fierce but unsuccessful effort to regain their freedom. Their city was taken by Alexander, who levelled it to the ground and sold the entire population—men, women, and children—into slavery. For 20 years it remained an utter desolation; but B.C. 315 it was rebuilt by Cassander, who gathered into it all the Thebans whom he could find in Greece. It was again destroyed by the Romans, and did not recover till about the decline of the empire. During the 11th and

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12th centuries it was the seat of a considerable population, engaged in the manufacture of silk; but under the Turks it again declined, though it has still a modern representative, Thebes, or Thivæ (pop. 4,000). Scarcely a relic of antiquity has survived the ravages of time.

THECA, n. *thē'kă,* THEACÆ, n. plu. *thē'sē* [Gr. *thēkē,* a sheath or case]: in *bot.,* the case containing the spores in some flowerless plants; in *anat.,* an organ or part which incloses another or contains something; a sheath or case. THE'CAL, a. *-kăl,* pertaining to or of the nature of a theca.

THECAPHORE, n. *thē'kă-fōr* [Gr. *thēkē,* a sheath; *phorĕō,* I bear]: in *bot.,* the roundish stalk on which the ovary of some plants is elevated.

THECASPOROUS, a. *thē-kâ-spōr'ŭs* or *thē-kăs'pō-rŭs* [Gr. *thēkē,* a case; *spora,* a seed]: in *bot.,* having the spores in thecæ or cases, as some fungi.

THECLA, *thĕk'la,* SAINT: a virgin saint of the early church, whose existence may be considered historical, though almost all the details regarding her are legendary. According to the legend, Thecla was of a noble family of Iconium in Lycaonia, where she was converted by the preaching of the apostle Paul, and having devoted herself to a life of virginity, suffered a series of persecutions from her intended bridegroom, as well as from her parents. She is styled in the Greek martyrologies 'he *proto-martyress,* as Stephen is the proto-martyr; while in the Roman Breviary she is said to have died at the age of 90 in Seleucia. The apocryphal *Acts of Paul and Thecla* were edited by Aischendorf: a translation is in the *Ante-Nicene Christian Library.*

THECODONT, n. *thē'kō-dŏnt* [Gr. *thēkē,* a sheath or case; *odous* or *odonta,* a tooth]: a saurian which has the teeth implanted in sockets. THE'CODON'TIA, n. plu. *-dŏn'-shĭ-ă,* one of the thirteen orders into which Professor Owen arranges the reptilia, living and extinct.

THECOSOMATA, n. plu. *thē'kō-sō'mă-tă* [Gr. *thēkē,* a sheath; *sōmăta,* bodies]: a division of pteropodous mollusks, in which the body is protected by an external shell.

THEE, v. *thē* [AS. *theon,* to grow, to thrive: Goth. *theihan,* to increase]: in *OE.,* to thrive; to flourish; prosper.

THEE, pron. *thē* [AS. *thê,* thee: Goth. *thuk,* thee]: the objective case of *thou.*

THEEK, or THEIK, v. *thēk* [see THATCH]: in *Scot.* and *prov. Eng.,* to thatch.

THEFT, n. *thĕft* [Goth. *thiuvs;* Icel. *thjofr;* Ger. *dieb,* a thief]: the taking possession of the goods or movables of another secretly without leave or with violence; the act of stealing; Larceny (q.v.); that which

is stolen (see STOLEN GOODS, PURCHASE OF). THEFT'UOUS, a. *-ū-ŭs,* in *Scots law,* of the nature of theft; tainted with theft. THEFT'UOUSLY, ad. *-lĭ.*

THEINE, n. *thē'ĭn,* or THEINA, n. *thē-ī'nă* [new L. *thĕa,* the tea-plant]: a bitter and volatile principle, obtained in the form of fine white prisms, of a silky lustre, from tea, coffee, etc.; same as *caffeine.* See TEA; CAFFEINE.

THEIR, poss. pron. *thär* [AS. *thara,* of the, of those: Icel. *their,* they: *theirra,* of them]: of them; poss. plu. of *They* (q.v.). THEIR is used when prefixed to a noun or to an adjective and its noun, as, *their* own statements; THEIRS is employed as the substitute for a noun, and stands alone, as, the statements are *theirs, theirs* is the best cultivated field.

THEISM, the doctrine of the existence of a God, or Gods. It may take the form either of monotheism or polytheism, and is opposed only to atheism, which denies the existence of such divine beings. From its use to express the belief of cultured Christian peoples, the term has been given a more restricted meaning. Thus, theism has been identified with monotheism, as implying belief in one God, and hence is distinguished from all forms of polytheism. Further, theism is distinguished from pantheism on the one hand, and deism on the other. Pantheism (q.v.) merges God with the world-process and thus practically denies his personality. Deism (q.v.) emphasizes the personality of God, but conceives him as existing apart from the world of his creation. Theism endeavors to rise above both of these extremes and embrace the truth contained in each. On the one hand it maintains the personality of God and his transcendence of the world. On the other it insists upon the immanence of God, upon his presence in the world as its controlling and life-giving agency. Thus the God of theism is at once the Author and the Preserver of the world. In every age and among every people of history, some form of theism is to be found as the basis of religious observance. This belief is refined and developed with the progress of thought and civilization, and the direction of this development is generally in the line above mentioned, from polytheism to monotheism, and on to a comprehensive theism. Thus the traditional polytheism of Greece broke down under the influence of philosophic reflection; but this reflection itself culminated in the theistic philosophy of Aristotle. As the theoretical basis of religion and the ultimate explanation of the universe, theism has always had a prominent place in systematic reflection. In the earlier centuries of the Christian era it was the topic of supreme importance, and the best effort of theologians and philosophers was given to its discussion and exposition. As a result, certain proofs for the existence of God were

formulated, the most important of which possess considerable historic interest. We may mention three of these arguments: (1) The Ontological argument, first proposed by Anselm, infers the existence of God from the idea of a most Perfect Being. The presence of this idea in the human mind entails the existence of such a Being, for existence is one of the perfections necessarily contained in the idea of Most Perfect Being. (2) The Cosmological argument was adapted from Aristotle, and proceeds upon the principle that every effect must have a cause. The world is such an effect. It is impossible to suppose that the series of natural causes goes back to infinity, and consequently we are compelled to assume the existence of a Divine First Cause, adequate to account for the existence of the world. (3) The Teleological argument is based upon the evidences of design in the world, and infers therefrom the existence of a designing mind as its Author. These formal arguments were subjected to a destructive criticism by the philosopher Kant at the end of the 18th century. He attempted to show how they depended one upon the other, and all contained contradictions and inconsistencies. Kant held that the moral argument was the only possible proof for the existence of God. This argument maintains that the existence of right and duty presupposes the existence of a God who will ultimately proportion happiness to virtue and *vice versa*. Kant's criticism was effective in destroying the force of the three above-mentioned proofs in their traditional formulation. Evolutionary science has also contributed to lessen the force of the cosmological and teleological arguments in their earlier and cruder statement. If the present complex condition of the world is the result of a slow process of development from a simpler condition, the need for a first cause of the present world is less apparent. If present organic structures owe their existence to their utility (that is, are the result of natural selection, q.v.), their purposiveness is explained by natural causes. But all such criticism, including that of Kant, is effective rather against the form than the substance of theistic argument. It has led only to a reconstruction of old arguments and their statement in a more adequate and convincing manner. Thus it would seem that the arguments for the existence of God are rather stronger than weaker, as the result of criticism. We can only indicate in outline what form some of these arguments have taken in recent years. (1) Belief in God is justified by the needs of human thought. The constant endeavor of the human mind, in its thought, is to introduce more perfect unity, more complete system, into its knowledge. The idea of God by virtue of its all-inclusiveness, is required as the final instrument of organization to make this unity complete; for by it the self and the world are adjusted as elements of one uni-

versal life. Thus the idea of God proves its own reality by its function in knowledge. (2) The existence of God is evidenced by the nature and development of the world. In the natural world we have a series of events related as cause and effect, and each dependent upon the other. Since each component part is dependent upon and determined by some other part, it is impossible to conceive the whole series as standing alone. It is rather by its very nature dependent, and requires for its existence and support some ground or underlying principle that is self-determined. From the nature of the world as dependent and relative, therefore, we are led to believe in the existence of an Underlying Principle that is self-determined and absolute. If we consider next the development which the natural world has undergone, we see its culmination in man with his intelligence and civilization. The character of the underlying principle or ground of any process will, of necessity, be more completely manifested as the process unfolds. Thus the intelligence and personality of man, as the outcome of the natural order, reveal to us the intelligence and personality of its Ground. (3) The ideals of human activity, both theoretical and practical, presuppose the existence of a God. The thought of man has an ideal, Truth, for which it ever strives. Yet Truth exists in no single human mind, neither is it the possession of the race. Truth as an end is too real to be imaginary, but if real it must exist somewhere. We are forced then to assume a divine mind in which Truth exists in all completeness. The same is true of the Good, the ideal of human conduct. That Good which, as moral ideal, exercises absolute authority over all men, is relative neither to individual desires nor to the desire of a society of individuals. Here, too, we are obliged to assume a Divine personality whose plans are realized in the moral order, and whose purposes are represented in the moral idea. See Flint, *Theism;* Fraser, *Philosophy of Theism;* Caird, *Evolution of Religion;* Schurman, *Belief in God;* Royce, *The Concept of God.*

THEISS, *tīs:* chief river of Hungary, an important affluent of the Danube; rising by two streams, the Black Theiss and the White Theiss, in the Carpathian Mts. It flows n.w., s.w., and finally s., joining the Danube, after flowing parallel to it 300 miles. The Theiss has several large and navigable affluents, e.g., the Maros and Bodrog. Its lower course is sluggish, and it has often inundated the plains, flooding the cities on its banks, such as Szegedin (overwhelmed 1879). The Theiss is extraordinarily rich in fish, and has been described as 'two-thirds water and one-third fish.' Its entire length, including windings, is 828 miles.

THEISTIC CHURCH, n. *thē-ĭs'tĭk:* in *chh. hist.*, a church founded London 1871, for the purpose of promul-

gating the theistic views of the Rev. Charles Voysey, formerly vicar of Healaugh. Some men of eminence were among its promoters. Their belief recognizes one living and personal God, declares for individual liberty of opinion and for progressive thought, bases religion on morality, and asserts the ultimate goodness and blessedness of every human being.

THEM, pron. *thĕm* [AS. *thám,* to them]: the objective case of the pron. *they.* THEMSELVES′, comp. pron. *-sĕlvz′* [*them,* and *selves*]: an emphatic form of *them;* those very persons.

THEME, n. *thēm* [F. *thème*—from L. and Gr. *thĕma,* a *theme*—from Gr. *tithēmi,* I place; It. *tema*]: a subject for discussion; the subject on which a person speaks or writes; a short essay on a given subject; the primary or radical part of a verb; the stem or part to which the inflectional endings are added; in *music,* a series of notes selected as the subject of a new composition; the leading subject or melody of a movement. THEMATIC, a. *thē′-măt-ĭk,* pertaining to or containing a theme. THEMATIST, *thĕm′a-tĭst,* writer of themes.

THEMIS, n. *thē′mĭs* [L. and Gr. *Thĕmis,* Themis: Gr. *thĕmis,* that which is established by old usage, law—from *tithēmi,* I place]: in *anc. myth.,* the goddess of law and justice: in *astron.,* one of the asteroids.—*Themis* was daughter of Uranus and Gē, wife of Zeus, and, by him, mother of Horæ (Hours) and Mœræ (Fates), as also of Eunomia (Equity), Dikē (Justice), and Eirēnē (Peace). In modern art, Themis is represented as having her eyes bandaged, holding a pair of evenly balanced scales in one hand, and a sword in the other.

THEMISTOCLES, *thē-mĭs′to-klēz:* Athenian general and statesman: b. in the latter part of B.C. 6th c.; d. at the age of 65, prob. between B.C. 460 and 447; son of an obscure citizen of Athens. From early life he was actuated by excessive ambition, and began his public career by opposition to the principal men of the state, chiefly Aristides, 'the Just.' It is uncertain whether he was at Marathon, but there is no doubt that the laurels gained there by Miltiades fired Themistocles' ambition. From the time (483) that he got his inconveniently upright rival, Aristides (q.v.), ostracized, he was regarded as the political leader in Athens, being made Archon Eponymus 481. To recover for Athens the naval supremacy in Greece, and that she might be prepared to meet the expected Persian invasion, he persuaded the Athenians to apply the proceeds arising from the silver mines at Laurium to construction of a fleet, sagaciously foreseeing that his country's only chance of overcoming her enemy was by sea. In the battles of Artemisium and Salamis (480), disastrous for the Persians, Themistocles, commander of the Athenian fleet, the largest in Greece, to avoid dissensions, served under Eurybiades the Spartan.

On both these occasions, it was only by the greatest tact, combined with threats and a judicious outlay of the bribes which he himself had received in profusion, that T. could induce the other commanders to come to an engagement with the Persians. On the night previous to Salamis, he sent a faithful slave to tell Xerxes that now was his opportunity for attack, as the Greek fleet was dividing and about to disperse; by this stratagem securing either victory to the Greeks, or the favor of Xerxes to himself in case of defeat: see SALAMIS. In several other ways did the wily T. contrive to provide for himself a safe retreat at the Persian court in case of disaster. The victory at Salamis raised his reputation to the highest point. Not neglecting his own personal aggrandizement, he sailed round among the Grecian islands, and extorted enormous sums from those inhabitants who had sided with the enemy, from which exactions he filled his own purse. Shortly after the Persian invasion, partly through Spartan influence, partly because of his offensive boastfulness, he lost favor with the Athenians, was accused of bribery and extortion, and B.C. 471 was ostracized, and retired to Argos: and finally, to escape being tried for treason, in which he was implicated by the correspondence of Pausanias, he betook himself 465 to the court of Artaxerxes, King of Persia, as a fugitive from the ungrateful country which he had saved; but before he would see the king himself, got permission to wait a year, during which he made himself master of the language and usages of Persia. At the end of this time, he managed to raise himself so highly in the king's favor, that, after the Persian fashion, the town of Magnesia was appointed to supply him with bread, Lampsacus with wine, and Myus with other provisions. He abode at Magnesia for the short remnant of his life. Some authorities assert that he poisoned himself. A monument was erected to T. in the market-place of Magnesia, and it is said that his bones were secretly taken to Attica, and burned there. Undoubtedly, T. was a man of very great sagacity and determination; and had a quick and keen perception of difficulties both present and future, which his ready invention, backed by promptness of action, enabled him to meet and overcome. On the other hand, he appears to have been devoid of moral principle, his greatest ambition apparently having been to make himself, by fair means or foul, the greatest man in Greece.

THEN, conj. *thĕn* [AS. *thonne* or *thænne*; Ger. *dann*; Dut. *dan*, then]: in that case; therefore; in consequence: AD. at that time, referring to a specified time either past or future; soon afterward; at another time. BY THEN, by that time. NOW AND THEN, at one time and another; at intervals of time. TILL THEN, until that time.

THENAR, n. *thē'nâr* [Gr. *thĕnar*, the palm of the hand]: in *anat.*, the palm of the hand or sole of the foot; also the fleshy mass which forms the ball of the thumb, consisting of four muscles. THENAR, a., or THENAL, a., *thē'năl*, pertaining to the thenar.

THENARDITE, n. *thē-nâr'dīt* [after *Thenard*, French chemist]: sulphate of soda occurring in crystalline crusts, of a vitreous-white color, at the salt-springs near Madrid, and in Peru: it is used in preparing sodium carbonate.

THE'NARD'S BLUE: see BLUE.

THENCE, ad. *thĕns* [AS. *thanan;* Ger. *dannen*, thence]: from that place, source, or time; for that reason; in consequence: though inelegant, and a pleonasm, the use of *from thence*, for *thence*, is not uncommon, even among good writers. THENCEFORTH, ad. *thĕns'fōrth* [*thence*, and *forth*], or THENCEFOR'WARD, ad. [*thence*, and *forward*]: from that time onward.

THEO-, prefix, *thē-o* [Gr. *theos*, God]: the first element in many words derived from the Greek referring to the Divine Being or divinity.

THEOBALD, *thē'o-bawld*, LEWIS: 1688-1744, Sep ; b. Sittingbourne, Kent, England; son of an attorney. He published 1714 a tragedy, *Electra*, and afterward dramas. As dramatist and poet he has long been forgotten; but as the favorite butt of Pope he is immortalized in the *Dunciad*. Besides this unenviable distinction, T. has some claim to be remembered as one of the most laborious and useful of early Shakespearean editors and commentators. In this capacity, dull as he undoubtedly was, he did good service to the poet. The hatred of Pope he incurred by his pamphlet, 1726, *Shakespeare Restored, or a Specimen of the many Errors as well committed as unamended by Mr. Pope in his Edition of this Poet;* but though he could not compete with his adversary in wit, he proved himself a more competent editor of Shakespeare by his ed., 7 vols. 8vo, 1733, which quite extinguished that of his rival.

THEOBROMA, n. *thē'ō-brō'mă* [Gr. *thĕŏs*, a god; *brōmă*, food]: in *bot.*, a genus of plants producing the cacao or chocolate nut, forming the chief ingredient in chocolate; the beans of the *Theobrōma cacaō*, ord. *Byttneriăcĕæ*. THE'OBRO'MINE, n. *-mĭn*, crystalline alkaloid ($C_7H_8N_4O_2$), nearly related to theine, found in the seeds of *Theobrōma cacaō*. It is less soluble in water than caffeine, but resembles that substance in forming crystallizable salts with some of the acids. By dissolving theobromine in a solution of ammonia, and adding nitrate of silver, a gelatinous precipitate is obtained, which, by boiling with a solution of ammonia, yields a crystalline mass of theobromide of silver ($C_7H_7AgN_4O_2$), in which 1 equivalent of hydrogen is replaced by 1 of silver. This compound, when heated to 212° F. with methyl-iodide, is converted into methyl-theobromine, $C_7H_7(CH_3)N_4O_2$, which has precisely the same elements (and in the same proportions) as thiene or caffeine, $C_8H_{10}N_4O_2$.

THEOCHRISTIC, a. *thē'ō-krĭs'tĭk* [Gr. *thĕŏs*, a god; *christos*, anointed]: anointing by God.

THEOCRACY, n. *thē-ŏk′rā-sĭ* [Gr. *theokratia*, the rule of God—from *theŏs*, a god; *kratos*, strength. F. *théocratie*]: government by immediate direction of God, e.g., in the anc. Jewish state; the state thus governed. THEOCRATIC, a. *thē′ō-krăt′ĭk*, or THE′OCRAT′ICAL, a. *-ĭ-kăl*, pert. to or of the nature of a theocracy; administered by the immediate direction of God. THE′OCRAT′ICALLY, ad. *-lĭ.*—*Theocracy* is that form of government in which God is regarded as the sole sovereign, and the laws of the realm as divine commands rather than human ordinances. Under such a view, the priesthood necessarily become the promulgators and interpreters of the 'divine commands,' and act as the officers of the invisible Ruler. The most famous example of a T. is that established by Moses among the Hebrews.

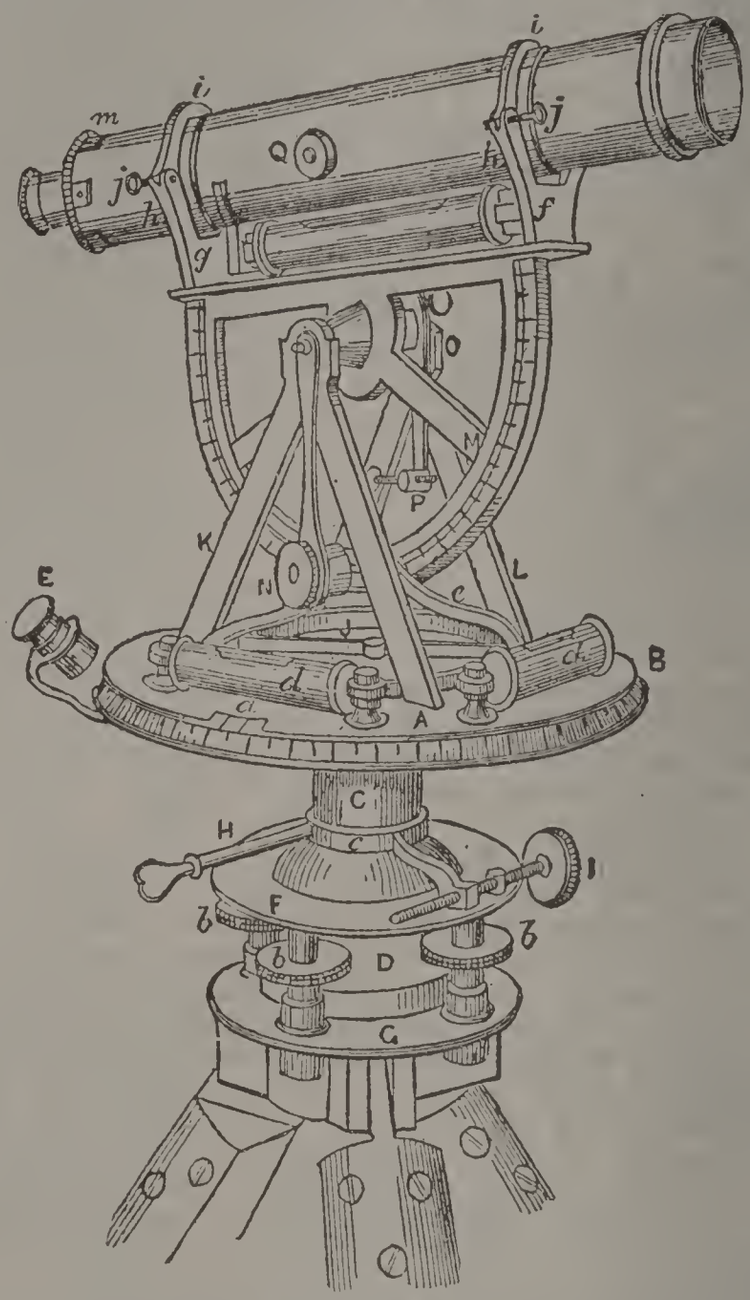
THEOCRASY, n. *thē-ŏ-krā′sĭ* [Gr. *theokrāsia*—from *theŏs*, a god; *krasis*, a mixing], a mixture of the worship of different gods, as of Jehovah and idols; in *anc. phil.*, an intimate union of the soul with God in contemplation.

THEOCRITUS, *thē-ŏk′rĭ-tŭs:* earliest and most celebrated Greek pastoral poet; b. Syracuse, early in B.C. 3d c.; date of death unknown; son of Praxagoras and Philinna. The period of his greatest literary activity was probably about B.C. 272. About the close of the reign of Ptolemy Soter, he visited Alexandria, where he received instruction and made his first successful essays in poetry. He was patronized by Ptolemy Philadelphus, then assisting his father, Ptolemy Soter, in the government of Egypt; and in honor of his patron, he composed, about B.C. 285, his 14th, 15th, and 17th idyls. He was an acquaintance of the poet Aratus, to whom he addressed his 6th idyl. He subsequently revisited Syracuse, where he resided under Hiero II. From his 16th idyl, it is inferred that he was dissatisfied with the political state of Sicily, also with the insufficient rewards which his poems received from Hiero; and that he turned his literary art toward rural life. The idyls of T. are principally representations, dramatic and mimetic, of the every-day life of the Sicilian peasantry. They were successfully imitated by Virgil, and have given origin to the pastoral literature of mediæval and modern times, which is, however, deficient in the simplicity, fidelity, and therefore poetry of the Syracusan author. T. knows nothing of the imaginary shepherds of a fictitious Arcadia; his dramatic simplicity and truth are in wide contrast to the affected sentiment, the unnatural innocence, and the artificial simplicity of that unreal world. Comedy and pathos enter freely into his representations of rural Sicilian life, and his idyls retain the charms of freshness and nature even to the present day. Not all of them are strictly bucolic; and of the 30 ascribed to T. a few are not genuine. They are written in a mixed dialect, in which the softened Doric prevails; and with a few lines from a lost poem called *Berenice*, and 23 epigrams in the Greek Anthology, they form his literary remains, of which the best eds. are those of Meineke, and Fritzsche (2d ed. 1870); there are English translations by Creech, Chapman, Calverly, and others.

THEODICY, *thē-ŏd′ĭ-sĭ* [Gr. *Theos*, God, and *dikē*, justice; L. *Theodicæa*, the judgment of God]: systematic exposition of the theory of Divine Providence, with a view especially to vindication of the attributes, particularly the holiness and justice, of God in establishing the present order of things, in which evil, moral as well as physical, so largely appears to prevail. The name is of modern origin, dating from the close of the 17th c. or the beginning of the 18th c.; but the theory itself, as well as the mysterious problem with which it deals, is as old as philosophy itself: see EVIL. The first to consider the question in its integrity was Leibnitz (q.v.). His work *Essais de Theodicée sur la Bonté de Dieu, la Liberté de l'Homme, et l'Origine du Mal*, was pub. 1710. It rose at once to the very highest popularity, and was translated into almost every European language. The leading principle of Leibnitz's vindication of God's goodness is the well-known optimistic theory (see OPTIMISM); but he has been followed by several writers in different countries—e.g., Balguy, Werdermann, Kindervater, Creutzer, Benedict Kapp, and many others. Of these writers it may be said, in general, that they have followed the same method, and have addressed themselves to the same view—the reconciliation with the goodness, the holiness, and the justice of the one God, of the existence of those manifold evils, physical or material, as well as moral, which appear in the present order of things. This view is evidently limited to a single problem. But in the discussions of the new philosophic systems, especially that of Hegel, which have arisen in Germany, new difficulties regarding the usual theories about God set forth in Christian writers have arisen out of the rationalistic notions of existence in general. To meet those difficulties, a new theodicy became requisite, and has occupied philosophers, especially in France—see Maret's *Christian Theodicée, or Comparison of the Christian and the Rationalistic Idea of God* (1845); and the discussion by the Jesuit philosopher Père Gratry, in vol. I. of his course of philosophy, *De la Connaissance de Dieu* (Paris 1853). European and American theological works of later years also deal with this theme.

THEODOLITE, n. *thē-ŏd′ō-līt* [Gr. *thèāŏmai*, I see; *dolĭchos*, long; also given from *hodos*, a way; *litos*, smooth: the first part of the word is certain: F. *théodolite*]: instrument for measuring angles, used by land-surveyors, especially in trigonometrical surveying. THEOD′OLIT′IC, a. *-lĭt′ĭk*, pert. to a theodolite.—The *Theodolite* is an altitude and azimuth instrument, proportioned and constructed so as to be conveniently portable. Like all instruments in general use, the variations in its construction are almost numberless; but its main characteristics continue unaltered in all forms. It consists essentially of two concentric circular plates of copper, brass, or other material (the upper plate, or *upper horizontal*, either being smaller, and let into the lower, or *lower horizontal*, or the rim of the lower raised round the outside of the upper), moving round a common axis, which, being double, admits of one plate moving independently

of the other. Upon the upper horizontal rise two supports, bearing a cross-bar, which is the axis of a *vertical circle*



Theodolite:

A, B, the horizontal limbs; *a*, the vernier plate, which turns; C, the vertical axis; D, the ball or socket movement; *d*, *d*, spirit-level; E, a magnifier to read off the degrees; F, G, plates held together by the ball D; *f*, a screw to adjust the level or line of collimation; *b*, *b*. *b*, milled screws to adjust the instrument, and set in level; *g*, a screw to adjust the telescope laterally: H, a clamping screw, by which means the collar *c* may be tightened to the axis C, and kept from moving; J, the magnet-box; I, a slow-motion screw, by which the instrument is moved more exactly than could be done by the hand; *i*, *i*, clips, to reverse the telescope by screws, *j*, *j*,; K, L, frames into which the pivots are placed, on which the vertical arc M is turned round, and on which the telescope is fixed; N, a microscope for reading off the degrees; O, a clamp screw: P, a slow-motion screw, by which the vertical arc and telescope are moved; Q, a milled screw for moving the object-glass of the telescope.—From Cresy's *Encyclopædia of Civil Engineering*.

moving in a plane at right angles to the former. Either this vertical circle has a telescope fixed concentric with it-

self, or a semicircle is substituted for the circle, and the telescope is laid above, and parallel to its diameter. The circles, as their names denote, are employed in the measurement of horizontal and vertical angles. For these purposes, the outer of the horizontal circles is graduated, and the inner carries the index-point and the Verniers (q.v.); the vertical circle also is graduated, and the graduations are generally read off by means of an index-point and vernier firmly attached to the supports. The upper horizontal is furnished with two levels at right angles to each other, for purposes of adjustment, and has a compass-box let into it at its centre. The stand consists of a circular plate supported on three legs, and connected with the lower horizontal by a ball-and-socket joint; the horizontal adjustment of the instrument being effected by means of three or four (four is better) upright screws placed at equal distances between the plates. The telescope is so fixed as to be reversible, and the numerous adjustments are in great part similar to those of other telescopic instruments. Both horizontal plates being brought, by means of the screws and levels, to a true level, the telescope is pointed at one object, and the horizontal angles read off; it is then turned to another object, and the readings-off from the graduated circle again performed; and by the difference of the readings, the angular horizontal deviation is given; and when vertical angles are required, the readings are taken from the vertical circle in a similar manner.

THEODORA, *thē-o-dō'ra*, Empress: wife of the Eastern Roman emperor Justinian: b. prob. in Constantinople, early in the 6th c.; d. 547. The commonly received story of her life rests on the authority of Procopius, author of a volume of bitterly partisan *Anecdota*. According to Procopius, T. was dau. of a bear-feeder in the amphitheatre of Constantinople; became notorious as an actor in rough farces; was a courtesan in many cities of Asia Minor; and fascinated Justinian, then a senator. When Justinian succeeded to the throne, he was about 44 years of age, and she about 25. As empress she was all-powerful in the state, and not without reason, for in the great insurrection of Nika, 532, she showed herself of a character born to rule; and later she gave many proofs of courage, prudence, and capacity. In the fierce religious controversies of the time, she favored the Monophysites, though her husband stood with the orthodox.—See Procopius, *Anecdota;* for a critical study of the historical sources, see Antonin Débidour, *L'Impératrice Theodora*.

THEODORE, *thē'o-dōr*, King of Abyssinia; otherwise entitled Negus or King of Kings of Abyssinia; original name *Kassai:* 1820–1868, Apr. 13 (reigned 1855–68); nephew of a chief in Amhara, the central province—the others being (see Abyssinia) Tigré and Shoa. His mother was left a widow in poverty. T. became distinguished as a soldier against the Turks; wrested the chieftainship from his uncle's sons; defeated Ras Ali, the powerful ruler of Amhara; obtained possession of the person of the titular emperor Johannes; and annexed Tigré. Securing the

favor of the Coptic Church by banishing Rom. Cath. missionaries, he was crowned as Theodore of Abyssinia. He soon conquered Shoa; and then resolved to recover from the Turks the sea-board, formerly Abyssinian. T. showed favor to Englishmen, was desirous to open intercourse with England, and permitted the founding of three Prot. missions. But his ignorance, with his suspicious and jealous temper—always imagining slights and insults—made negotiation with him very difficult; and he soon quarrelled with Eng. diplomacy. In 1862 the Egyptians were advancing within T.'s frontiers; and T. wrote letters to the English and French governments, claiming their protection. That to the queen was delayed on the way, and overlooked after reaching London, and had no answer for two years. The answer to his letter to France was unfortunately worded. T., irritated, threw the Brit. consul and missionaries into prison, and violently maltreated other European residents. After this period (1863) he conducted himself like a madman—causing women and children to be tortured, dishonored, and starved. 'Out of 3,000,000 inhabitants,' says Dr. Blanc (1867), 'he has destroyed more than a third by war, famine, and murder.' After unsuccessful attempts to negotiate with T., followed by his refusal to notice a demand for delivering the prisoners, a Brit. expedition of more than 10,000 soldiers was fitted out at Bombay for invasion of the table-land of Abyssinia; and 1868, Apr., it came within sight of Magdala. Apr. 10, near Magdala, T. gave battle to the Brit. forces, and was defeated. He then surrendered the European captives and retired into Magdala. The place was carried by storm on the 13th with little difficulty. There was no loss of life on the Brit. side, and only a few men wounded; the Abyssinians lost 500 killed and 1,500 wounded: the king himself was found among the dead.—See an article in No. 65, *Westminster Review*, New Series.

THE'ODORE OF MOPSUESTIA: writer of the Syrian Church, foremost representative of the school of Antioch and notable in the controversy of 'The Three Chapters' about 350–428 or 9; b. Antioch; of a wealthy and distinguished family. He was school-fellow and friend of St. John Chrysostom, and his fellow-pupil under the philosopher and rhetorician Libanius; and he was induced, by the earnest exhortation of Chrysostom, to join him in entering the monastic life. His theological and scriptural studies were under Flavian of Antioch and Diodorus of Tarsus; and having received priest's orders, he resided at Antioch, where his learning and eloquence won the highest applause; and afterward at Tarsus, under his old teacher Diodorus. About 390, or a little later, he was chosen Bp. of Mopsuestia in Cilicia. In 394 he preached in the presence of Emperor Theodosius at Constantinople, on occasion of a synod held in that city. His literary activity must have been prodigious, if we can judge by contemporary accounts, and by the number of the works ascribed to him, of which only fragments remain. His most important works were commentaries on almost all

the books of Scripture, and polemical writings. A supposed tendency to Pelagian and Nestorian errors was observable in T., and was in part the occasion of the long controversy of the Three Chapters, which arose long after the death of T. The freedom of his views on the inspiration of the Scriptures, with his divergence on some points of theology, caused his name to be dropped from the list of orthodox writers; though the Syrians have always highly esteemed him. Considerable fragments of T.'s commentaries have been published by Cardinal Mai in *Spicilegium Romanum*, and a very small proportion of his works are extant in Syriac.

THEODORET, *thē-ŏd'o-rĕt* (L. *Theodoretus*, Gr. *Theodoretos*, given of God): celebrated church historian and theological writer: about 390–457 or later; b. Antioch. He was educated from childhood in a monastery, where, among his fellow-pupils, were Nestorius and John of Antioch, both afterward prominent in the Nestorian controversy. He was admitted among the clergy of Antioch; and in comparative youth became Bp. of Cyrus, a city of Syria. His zeal and eloquence were the theme of universal praise, and his success in bringing unbelievers and heretics to the church was almost unprecedented. In the controversies concerning Nestorius and his doctrines, which followed the condemnation by the council of Ephesus 431, T. for a time took active interest. The party of Nestorius was with difficulty brought to an accommodation with Cyril of Alexandria, in virtue of which the condemnation of Nestorius by the council was acquiesced in by John, Bp. of Antioch. For a time, T. dissented from this condemnation of Nestorius; but afterward saw the necessity of yielding, and concurred in the deposition of those bishops who persisted in rejection of the council of Ephesus. Nevertheless, he did not fully accept the views of Cyril; and when Cyril's successor in the see of Alexandria, Dioscorus, showed a tendency toward Eutychianism (see EUTYCHES; MONOPHYSITES), T. endeavored to induce Dioscorus to abandon such extreme opinions, and composed the work (known in modern controversy by its passage as to the change of the Eucharistic elements) entitled *Eranistes, or the Many-shaped.* This work was regarded by Dioscorus as a renewal of the Nestorian error, and he obtained from Emperor Theodosius II. an order confining T. within the limits of his own diocese. The Robber Council (q.v.) of Ephesus, under Dioscorus 449, excluded T. from its sittings, and deposed him from his see; whereupon he was compelled to retire to the monastery at Antioch in which he had received his first education. All this, however, was reversed by the general council of Chalcedon 451. T. did not long survive his restoration. His works, four vols. folio, reprinted in ten parts 8vo by Schulze (Halle 1768–74), consist of commentaries on many books of the Old Test. and the whole of Paul's Epistles; *History of the Church* 325 to 429, in five books; *Religious History*, being lives of the Fathers of the Desert, curious and interesting pictures of early ascetic life; *Eranistes,* dialogue against

Eutychianism; *A Concise History of Heresies;* also orations, and nearly 200 letters. Of his works, his *History of the Church* is perhaps best known, but is of no great value. His works in dogmatic theol. are of high importance for the doctrinal history of that critical period. All T.'s writings reveal his sincere devotion to an exaggerated and idealized monasticism.—See Schulze's edition of *Theodoret Cyrensis Opera.*

THEODORIC, *thē-ŏd'o-rĭk*, THE GREAT, King of the Ostrogoths: founder of the Ostrogothic monarchy, which comprised Italy, Sicily, s.e. Gaul, Rhætia, Noricum, Pannonia, and Dalmatia: about 454–526, Aug. 30 (reigned 493–526); b. on the banks of the Neusiedler See, s. of Vienna. His father, Theodemir, was one of the three brothers (the other two, Walamir and Widimir) who on the death of Attila (453) freed their nation from the yoke of the Huns, and being the representatives of the royal line of the Amali, exercised a united sovereignty over it; but the death of Walamir, and the departure to Italy and Gaul of Widimir with a part of the nation, left T.'s father sole ruler of the Ostrogoths who remained in Pannonia. Previous to these events, T. had been given as a hostage to the Eastern emperor, in accordance with whose directions he had been accustomed to all kinds of athletic and martial exercises, so that after his return home 473, he was qualified to rule his ferocious and valiant kinsmen, at the death of his father 474. In the previous year the Ostrogoths had obtained parts of Mœsia and Dacia as settlements from Emperor Zeno, and for years they gallantly defended the empire from foreign aggressors, other Gothic tribes included; but the impolitic faithlessness of Zeno produced in revenge the devastation of Thessaly and Macedonia, and subsequently (487) a raid directed on the capital itself. The emperor, to free himself from his troublesome ally, gave T. permission to invade Italy, a suggestion gladly adopted by the warlike ruler, who started for Italy 488; and after forcing his way through the Gepidæ and others who attempted to bar his progress, and gathering recruits on the way, arrived in the summer of 489 on the frontiers of Italy. Odoacer had been forewarned and forearmed; and a desperate conflict between the two powerful armies took place near Aquileia (489, Aug. 28), distinctly to the advantage of the Ostrogoths. A more disastrous defeat was inflicted on Odoacer near Verona (Sep. 30), after which he took refuge in Ravenna; but having again gathered a large force, he was totally routed a third time on the banks of the Adda (490, Aug.), again blockaded in Ravenna, while the whole of Italy was being subdued; and having at last surrendered (493, Feb. 26), was treacherously and disgracefully murdered by T. in the following month. T. now assumed the title *King of Italy*, resisted the claim of suzerainty preferred by the Eastern emperor; and—except a victorious campaign against the Franks, to compel them to cease their assaults on the Visigothic dominions, the suppression of a rebellion in Spain against the authority of the infant monarch (his own grandson Amalric, during whose minority

Theodoric administered also the government of the Visigothic kingdom), and an expedition against the robber-hordes of the Bulgarians—he gave his long reign to the consolidation and development of his new kingdom. His followers received only one-third of the conquered country; the rest was legally secured to the then possessors, and by degrees his barbarous followers were placed on a footing of harmony with their fellow-subjects. Theodoric made Ravenna his capital; occasionally, when his n. frontier was threatened, removing to Verona.

Theodoric has a place in the highest ranks of monarchs. The foul blot on his character, besides the treacherous slaying of Odoacer, is the judicial murder of Boëthius (q.v.) and of Symmachus, for supposed connivance with the senator Albinus to restore the authority of the Eastern emperor in Italy; but every fact that can be gathered respecting this outrage indicates that it was the result of a burst of passion, intensified by his extreme, almost morbid, jealousy of Byzantine interference in Italy. The one great error of his administration was his neglect to assimilate his Ostrogothic subjects with the previous inhabitants, either by a common code of laws or by common official preferment.

THEODORIC I.: king of the Visigoths. He was chosen successor to Wallia about 419 A.D., and became desirous of extending his kingdom, especially so as to embrace the neighboring Roman cities of Arles and Narbonne. For this purpose he made war against the Romans after the death of Honorius in 423, and continued with varying results until 437, when he entered into an alliance whose exact terms are unknown. By 450 he came into closer alliance with the Romans in the endeavor to check the advance of Attila, who led his barbarian army across Lorraine and Champagne and captured the city of Orléans. Theodoric and Aëtius, the Roman general, encountered Attila near the village of Moirey, a few miles from Troyes, and fought the battle generally known in history as that of Châlons-sur-Marne, in 451. Theodoric was killed by an arrow; but the progress of Attila was checked and western Europe was saved from the domination of barbarism.

THEODORIC II.: son of Theodoric I. He was a member of the party who wished to remain on terms of peace with Rome, and when his brother Thorismund, who had succeeded Theodoric I., began to levy war against the Romans he took part in a rebellion that ended in the murder of Thorismund and his own elevation to the throne. As vassal of the Roman emperor Avitus he made an expedition against the Sueves, conquered and put to death their king, and was in a fair way of completing the conquest of Spain, when Avitus was deposed and killed, and Theodoric ceased his efforts. In 466 he was murdered by his younger brother Euric.

THEODO'SIA, or FEODO'SIA. See KAFFA.

THEODOSIUS, *thē-o-dō'shĭ-ŭs*, I., THE GREAT (also THE ELDER, in distinction from his grandson), Emperor of Rome: about 346–395, Jan. 17 (reigned 379–394): son of Theodosius, the great general of the Roman empire, who, after freeing s. Britain from the savage Caledonians who roamed over it at their pleasure, and annihilating the formidable rebellion of the Moor Firmus, which threatened to divorce the African provinces from the empire, was conspired against by his many malicious enemies at court, and summarily beheaded at Carthage 376. T., who had accompanied his father in his British campaigns, and afterward, by routing the Sarmatians, saved Mœsia from devastation, retired from active service after his father's murder, and dwelt on his patrimonial lands in Spain. But his abilities were not forgotten at court; and on the defeat and death of Valens (q.v.), his colleague, Gratianus (q.v.), feeling his inability to sustain alone the cares of empire, summoned T. from his retirement, invested him with the imperial purple, and confided to him as joint emperor (379, Jan. 19), the administration of Thrace, Dacia, Macedonia, Egypt, and the East, and especially the protection of the empire against the Goths. This last charge called for the full exercise of the new emperor's abilities, for the army at his command dared not face the Goths in the open field; and even when the Ostrogoths and Visigoths separated after the death of their able leader Fritigern, each breaking up into several bands, T. found it prudent to sow jealousy and dissension among them by promises and bribes; and after a four years' so-called campaign, succeeded in pacifying the Visigoths, the Ostrogoths retreating toward Scythia. The Ostrogoths returned 386, their ranks swelled by Scythians; but were totally routed in attempting to pass the Danube, and the survivors were transported to Phrygia and Lydia. In 387 T. undertook to restore to the throne of the Western empire Valentinian II. (whose sister, Galla, he married), brother of Gratian; and after a uniformly successful contest, the usurper Maximus was captured and put to death at Aquileia. In 392 the suspicious death of Valentinian, and the elevation of the puppet Eugenius by Arbogastes, the real ruler of the West, again summoned T. to interfere; and after two years of preparation, his motley army of Byzantines, Goths, Alans, and Huns, aided by the treachery of some of Eugenius's generals, gained a complete victory over the Gauls and Germans, who chiefly constituted the army of the West; and the two portions of the Roman empire were again united under one ruler. The union, however, lasted only four months, owing to the death of T. T., though professing the orthodox Christian faith, was not baptized till 380, and his behavior after that period stamps him as one of the most cruel and vindictive persecutors who ever wore the purple. His arbitrary establishment of the Nicene faith over the whole empire, the deprivation of civil rights of all apostates from Christianity and of the Eunomians, the sentence of death on the Manicheans and Quarto-decimans (q.v.), all prove this; though lack of evidence for the direct

execution of these severe laws may somewhat modify our unfavorable judgment, and suggest that, like the massacre at Thessalonica, they were the result of a sudden access of savage passion, carefully fanned by his interested ecclesiastical advisers. His humiliation before St. Ambrose, Bp. of Milan, for the massacre at Thessalonica, was regarded by the church as one of its greatest victories over the temporal power: see AMBROSE.—THEODOSIUS II., surnamed THE YOUNGER (401–450), only son and successor of Arcadius (q.v.), and grandson of T. I., succeeded his father when eight years old, and occupied the throne of the East 42 years. The chief events of his reign were the invasion of the empire by the Huns under Attila, a war with Persia, renewed efforts to extirpate paganism, and the compilation of the *Codex Theodosianus* (see CODE): this emperor was the feeblest of rulers, better adapted for the cowl than for the sceptre and sword.

THEODOTIAN, n. *thē-o-dō'shĭ-an:* in *eccles.* and *chh. hist.*, one of a sect named after Theodotus, tanner in Byzantium, who, apostatizing during a Roman persecution, A.D. 192, palliated his fall by representing that the Lord Jesus, notwithstanding his miraculous conception, was only a man; and that therefore he, in denying Christ, had denied a man and not God. The name was given also to followers of another Theodotus, disciple of the former, who organized the sect (called also Melchisedicians) 210, and who held that Jesus, though born a man, became God at his baptism. Some of Theodotus's followers thought that Jesus became so at his resurrection, and others that he was never so.

THEOGONY, n. *thē-ŏg'ŏ-nĭ* [Gr. *thĕŏgŏnĭa*—from *thĕŏs*, a god; *gonē*, race, progeny]: the generation or genealogy of the gods; that branch of heathen myth. which taught the genealogy of their deities; one of a class of poems in which the ancient Greeks recounted the genealogy of the gods. The earliest is said to have been written by *Musæus* (q.v.); but his work, as well as the Theogonies of Orpheus (q.v.) and others, has perished; that of Hesiod (q.v.) being the only one that has come down to us. THEOG'ONIST, n. *-nĭst*, one who writes on theogony. THEOGONICAL, a. *thē'ō-gŏn'ĭ-kăl*, pertaining to theogony.

THEOLOGY, n. *thē-ŏl'ŏ-jĭ* [Gr. *theŏlŏgĭa*, theology—from *thĕŏs*, a god; *logos*, discourse: F. *théologie*]: science which treats of God and divine things; divinity (see below). THEOLOGIAN, n. *thē'ō-lō'jĭ-ăn*, one versed in the science of divine things. THE'OLOG'ICAL, a. *-lŏj'ĭ-kăl*, pert. to the science of divine things. THE'OLOG'ICALLY, ad. *-lĭ*. THEOLOGIZE, v. *thē-ŏl'ŏ-jīz*, to render theological. THEOL'OGIZING, imp. THEOL'OGIZED, pp. *-jīzd*. THEOL'OGIST, n. *-jĭst*, one versed in theology.—*Theology* is the theory of the divine nature and operation. The term occurs first in Plato and Aristotle, denoting the doctrine of the Greek gods and of their relation to the world. Homer, Hesiod, Orpheus, etc., are called *theologoi* (theologians), from the subject of their verse. But their T. is called 'mythic,' in distinction from the 'physical' T. of the philosophers, which, reversing

the mythic order, concerned itself with speculative inquiries regarding the origin of the world and its relation to the gods. In the New Test. the word T. does not occur, and the idea seems alien to the simplicity of the primitive faith in the Lord Jesus Christ. The Greek Christians originally designated any deep philosophical apprehension of the truths of religion by the term *Gnosis* (knowledge), as distinguished from *Pistis* (faith), the simple irreflective trust of the majority of humble believers. First during the 3d and 4th c. the word T. came into use, especially in connection with such of the Fathers as defended the doctrine of the Deity of the Logos. In this sense, the evangelist John and Gregory of Nazianzen were termed *Theologians*. During the same period, the word T. was applied to the doctrine of the Trinity. In the 5th c. its application was widened by Theodoret (q.v.), who used it to denote the whole circle of theoretical instruction in religion; and finally, Abelard, through his *Theologia Christiana*, gave the word that comprehensive signification which it still bears, as expressive not only of a theoretical but also of a practical exposition of religious truth.—See NATURAL THEOLOGY.

THEOMACHY, n. *thē-ŏm'ă-kĭ* [Gr. *thĕŏs*, a god; *machē* a battle]: in *anc. myth.*, a fighting against the gods, as the mythological battle of the giants with the gods. THEOM'ACHIST, n. *-kĭst*, one who fights against the gods.

THEOMANCY, n. *thē'ō-măn-sĭ* [Gr. *thĕŏs*, a god; *manteia*, divination]: a kind of divination drawn from the responses of oracles.

THEOPATHY, n. *thē-ŏp'ă-thĭ* [Gr. *thĕŏs*, a god; *pathos*, feeling or suffering]: sympathy with the divine nature; capacity for religious affections or worship; religious feeling; piety. THEOPATHETIC, a. *thē'ō-pă-thĕt'ĭk*, or THE'OPATH'IC, a. *-ĭk*, of or pertaining to.

THEOPHANY, n. *thē-ŏf'ă-nĭ* [Gr. *thĕŏs*, a god; *phainesthai*, to appear]: a manifestation of God to man by actual appearance. THE'OPHAN'IC, a. *-ō-făn'ĭk*, of or pertaining to.

THEOPHILUS, *thē-ŏf'ĭ-lŭs:* legendary precursor of Doctor Faust (see FAUST) in the forming of a compact with Satan; reputedly a coadjutor-bp. at Adana, in Cilicia. After the death of his bishop, being unanimously chosen successor, he declined the honor; but was shortly afterward, at the instigation of slanderers, deposed from his former office by the new bishop. He then had recourse to a Jew magician, who took him to a midnight meeting of devils, whose chief ordered him to deny Christ and the Virgin Mary, and to give a bond making over his soul: the result was, that next morning he was reinstated in his office and dignities by the bishop; and presuming on the support of his infernal confederates, he assumed a supercilious and domineering manner. But he was soon overtaken with remorse, and, through 40 days' fasting and prayers, prevailed on the Virgin Mary to intercede with her son for him, and to get back the letter from the devil, which she laid upon the breast of the repentant sinner, as he lay asleep in the

church. T. then made public confession of his crime, told of the goodness of the Virgin Mary, and died three days afterward. This legend, whose origin is traced back to an unknown Greek, Eutychianus, was brought, during the 10th c., through an equally unknown Neapolitan priest, Paulus, to the West, where it quickly spread far and wide. Before the end of the century, it was put into Latin verse by Roswitha, and, still better, by the Bp. of Rennes (d. 1123)—see *Acta Sanctorum*, Feb. 4; and *Hildeberti Turonensis et Marbodi Opera*, pub. by Beaugendre, Par. 1708. The legend—poetized and dramatized from the 10th to the 15th c.—has in various versions been translated into several languages; and frequent allusions to it occur in Latin, German, Anglo-Saxon, Icelandic, Swedish, French, and even Spanish literature. It has even been pictorially represented in French churches. Through the rescue of the repentant sinner by the Virgin Mary, this Rom. Cath. legend differs essentially from the stern Protestant shape of the devil's compact in the Faust-book, which, with rigorous consistency, requires the consignment of the contracting party to hell.

THEOPHRASTUS, *thē-o-frăs'tŭs:* Greek moralist and naturalist, successor of Aristotle in the Peripatetic school: b. at Eresus, in Lesbos, conjecturally between B.C. 373 and 368; d. B.C. 288. He studied philosophy at Athens, first under Plato; subsequently under Aristotle, who took especial interest in him. To T., moreover, Aristotle bequeathed the presidency of the Lyceum, his library, and the original MSS. of his writings. T. proved a worthy successor of the Stagirite. Under his presidency of 35 years the Lyceum attracted no fewer than 2,000 disciples, among whom was the comic poet Menander. The kings Philippus, Cassander, and Ptolemy held him in high esteem; and such was the admiration of the people of Athens for him, that, when he was arraigned for impiety, and triumphantly acquitted, they would have killed his accuser, had he not generously interceded. In compliance, however, with the law of Sophocles, which decreed the banishment of all philosophers from Athens, T., B.C. 305, left the city, until the enactment was repealed the next year by Philo, also a disciple of Aristotle. On the eve of dissolution, he is said to have complained of the shortness of human life, which was ending with him just when he was about to solve its enigmas. He sought to develop the Aristotelian system, to explain its obscurities, and to fill its gaps. Of his works only the following remain: 1. *Characteres*, descriptive of vicious characters; 2. *Of Sensuous Perception and its Objects;* 3. A fragment on *Metaphysics;* 4. *Of the History of Plants*, one of the earliest of extant treatises on botany; 5. *Of the Causes of Plants;* 6. *Of Stones.* The best complete ed. is that of Schneider; there are numerous eds. of the *Characteres* separately.

THEOPNEUSTY, n. *thē'ŏp-nūs'tĭ'* [Gr. *theopneustos*, inspired by a God—from *thĕŏs*, a god; *pnĕō*, I breathe]: divine inspiration. THE'OPNEUS'TIC, a. *-tĭk*, given by the inspiration of the Spirit of God.

THEOREM, n. *thē'ō-rĕm* [L. and Gr. *thĕōrēmă*, a theorem—from Gr. *thĕōrĕō*, I look at—from *thea*, a view: F. *théorème:* It. *teorema*]: universal demonstrable proposition; specifically, in *math.*, something laid down as a truth which is to be proved by a chain of reasoning, as distinguished from a problem or something which requires solution; in *alg.* and *analysis*, a rule or statement of relations expressed in a formula or by symbols, as the binomial theorem, Boole's theorem. THEOREMATIC, n. *thē'ō-rĕ-măt'ĭk*, or THE'OREM'IC, a. *-ō-rĕm'ĭk*, pertaining to or comprised in a theorem.

THEORY, n. *thē'ō-rĭ* [Gr. *thĕōrĭa*, an inspection—from *thĕōrĕō*, I look at—from *thea*, a view: F. *théorie*]: a doctrine or scheme of things terminating in speculation and without a view to practice; the abstract principles of any art considered without reference to practice; the opposite of practice; the science, distinguished from the art; the philosophical explanation of phenomena, either physical or moral; a scheme or system founded on inference drawn from certain principles, or from the particular arrangement of certain facts (see below). THEORETIC, a. *thē'ō-rĕt'ĭk*, or THE'ORET'ICAL, a. *-ĭ-kăl*, pert. to theory, or depending on it; not practical; speculative. THE'ORET'ICALLY, ad. *-kăl-lĭ*. THEORIC, n., or THEORIQUE, n. *thē'ō-rĭk*, in *OE.*, speculation; theory. THE'ORIZE, v. *-rīz*, to form a theory; to speculate. THE'ORIZING, imp. THE'ORIZED, pp. *-rīzd*. THE'ORIZER, n. *-rī-zĕr*, one who indulges in theory rather than in practice; a theorist. THE'ORIST, n. *-rĭst*, one who forms theories; one given to speculation. —*Theory* denotes the scientific process of generalization under various aspects.

Theory is, in the first place, opposed to Fact, or matter of fact, and signifies that a certain class of facts have been generalized and brought into a single comprehensive statement: it thus corresponds to a Principle, general truth, or Law of Nature. That a half-inflated bladder hung before the fire is expanded till it bursts, is a matter of fact; that bodies generally are expanded by heat, is the theory or general principle, comprehending the whole class of facts. To give the theory of a fact, in this sense of the word, is to give its general law; this is called also its Explanation, sometimes its Cause. See CAUSE.

Theory is, in the next place, distinguished from Hypothesis (q.v.). A fact may, for a time, be referred to a hypothetical or assumed principle; endeavors being meanwhile made to remove the hypothetical character, by proving or disproving the principle. The 'vortices' of Descartes was a hypothesis to account for planetary motions; while Newton's view, that gravity might be the cause of these motions, was, in the first instance, a hypothesis. The Cartesian doctrine (hypothesis) was disproved and abandoned; the Newtonian was fully verified, and, ceasing to be a hypothesis, became a theory.

Theory is, lastly, distinct from Practice. The theory

of a subject is the knowledge or explanation of it; the Practice is making some use of it. Physiology is theory; Physic, or Medicine, is practice. In practical matters, there are two modes of procedure further illustrative of the distinction now in hand. The knowledge possessed by a worker in any art may be empirical, experimental, rule-of-thumb—i.e., it may be gathered by actual experience in the particular operation; the seaman's knowledge of the prognostics of weather, and the cook's art in boiling and roasting, are usually of this kind. On the other hand, the worker's knowledge may be obtained from theory; in other words, from general principles or laws scientifically ascertained; as when the theory of the winds and the law of storms are employed to predict the weather; when the cook roasts and boils according to the known temperature for coagulating albumen; and when a physician prescribes a dietary grounded on chemical analysis of the food and of the tissues to be maintained. Great caution is requisite in employment of such theoretical knowledge in the arts and in practical affairs. It is not enough that the theories are fully established; we must also know the conditions of the case, so far as to allow for every agent operating to produce or mar the effect. That a cannon-ball should describe a parabola, is a correct theoretical inference from gravity and the laws of motion; but the resistance of the air, a distinct agency, makes it untrue in fact, therefore misguiding in practice. When this resistance is allowed for, the theory is complete, and its application will no longer disappoint the operator. See DEDUCTION.

THEOSOPHY, n. *thē-ŏs'ō-fĭ* [Gr. *thĕŏsophĭa,* divine wisdom—from *thĕŏs,* a god; *sophĭa,* wisdom; *sophos,* wise]: *literally,* divine wisdom; knowledge of divine things; a philosophy which professes a direct, as distinguished from a revealed, knowledge of God, supposed to be attained by extraordinary illumination; supposed direct intercourse with God and spirits (see below). THEOS'OPHIZE, v. *-fīz,* to practice theosophism. THEOS'OPHISM, n. *-fĭzm,* theosophy, or a process of it. THEOS'OPHIST, n. *-fĭst,* believer in theosophy. THEOSOPHIC, a. *thē'ō-sŏf'ĭk,* or THE'OSOPH'ICAL, a. *-ĭ-kăl,* pertaining to theosophy.

THEOSOPHY, *thē-ŏs'ō-fĭ* [Gr., wisdom concerning God]: knowledge of God by direct illumination, and without logical system and support as in theology. It differs from Philosophy in that it starts from a transcendental apprehension of deity to explain the universe, and does not generalize from phenomena to the being and attributes of God. It does not content itself with the relations of the soul to God, but speculates on the constitution and course of nature. It tends toward a pseudo-philosophy (rarely a formal philosophy) of man and the universe; also toward a pretentious show of ontology, including that of the Divine nature. The use of

the word is very loose; it has been employed to designate a wide variety of claims, opinions, and practices—the mean and the noble—from the atheistic fatalism and pessimism of Buddhism (q.v.) to the overwise subtleties of Neoplatonism and the Gnostics; from these to interpretative puerilities of the Cabala, the doctrines of Paracelsus (q.v.) and of the Rosicrucians, the magical arts of the middle and other ages, the visions of Swedenborg and that which has been regarded as the more typical theosophy as well as mysticism of Eckhart and Böhme.—Of late, the word has been applied specifically to an alleged form of Buddhism, which, so far as it is a philosophy, is a vague ontology, and more especially to a vaporous claim of superior and occult wisdom put forth by the late Madame Blavatsky, Col. Olcott, A. P. Sinnet, and others. Madame Blavatsky's crude and incoherent *Isis Unveiled* reveals nothing whatever. Col. Olcott's *Theosophy, Religion and Occult Science*, described as 'a howling menagerie of mixed metaphors,' asserts two sublimer states of matter, and—with a Hindu coloring—the human double, which, owing to varying conditions, may exist as invisible, or as a vapor, or as more solid and tangible. The miracles of communication with spirits by Madame Blavatsky were (it is claimed) exposed by missionaries, by her confederate Madame Coulcomb, and by Richard Hodgson, agent of the London Soc. of Psychical Research. Mrs. Annie Besant's London lecture, 1891, promising an exposition of theosophy in its recent Buddhist dress, proved to be a series of commonplaces about planes of existence and man's complex nature, such as are common property of all non-materialistic views.

The first theosophical society was formed in New York in 1875 with less than 12 adherents by Madame Blavatsky, who advocated a review of Sanskrit, Pali, Zend, and other ancient literatures as containing truths of highest value, and proposed to organize a society which should be the nucleus of a universal brotherhood of humanity, to promote study of Aryan and Oriental literatures, religions, and sciences. In 1884 the society was invited to England, where a branch was formed with A. P. Sinnet, author of *The Occult World*, as president. India is quite generally accepted by its advocates as the true home of the system, whose adherents now number more than 100,000. In its modern phase theosophy is a system that claims to embrace the essential truth underlying all systems of philosophy, religion, and science, and hence to be the one universal religion. Its doctrines may be embraced in three affirmations: (1) Underlying all manifestation is the infinite, eternal, immutable principle, known only through its manifestations, spiritual and material. This impersonal, inscrutable, infinite principle of life and being is the theosophist's highest conception of a Supreme Being. (2) A unity of consciousness, and also a unity of law, runs throughout the universe, embracing the physical, psychic, mental, and moral planes.

(3) The essential divinity is in man, and the progression of the divine ray passes through all the kingdoms of nature up to man, and beyond man as we know him, up to beings of godlike perfection, the evolution taking place by means of successive re-embodiment or reincarnation, and according to the law of cause and effect. *Karma*, 'the ethical law of causation,' by which are explained all the wretchedness of worldly conditions, and without a belief in the soul's responsibility for its acts wretchedness could not be justified. According to this theory the form as well as the condition under which each bodily appearance is made is predestined for it by its own past performance. The belief in a spiritual or 'astral' body, which is prominent in theosophy, holds that this body moving on the 'astral' plane, even in life, may be separated from the material frame and become the media through which extraordinary occurrences come about, transcending ordinarily understood laws and scientific conceptions. See MAHATMAS. In New York city the Anauta Theosophical Society was incorporated (1906), under the general laws of its organization as stated above.

THEOTHECA, n. *thē-o-thē'ka* [prefix *theo-:* Gr. *thēkē*, a case, a receptacle]: same as MONSTRANCE (q.v.).

THEOTOKOS, n. *thē-ŏt'o-kŏs* [Gr. *theotokos*, bringing forth or giving birth to God; *theos*, God; *tokos*, bringing forth]: in *chh. hist.* and *theol.*, a title of the Virgin Mary, adopted at the councils of Ephesus, 431, and Chalcedon, 451.

THERA, *thā'ra* or *thē'ra:* an island in the Ægean Sea, belonging to the Grecian archipelago, the most southerly of the Cyclades. It is of volcanic formation, and presents many interesting phases. New islands are formed from time to time by its volcanic action, notably the last in 1866. Scientists have given the island considerable attention and many observations have been made, and records kept. The soil is very fertile.

THERAMENES, *thĕ-răm'ĕ-nēz:* Athenian politician of the 5th c. B.C. He first became prominent in 411 as a member of the Council of 400, but perceiving the inevitable downfall of that government, he joined the opposing party and assisted in its overthrow. In 410 B.C. he was in command of a portion of the Athenian fleet, with which he cruised about and exacted tribute from the neighboring islands, and later he joined the fleet under Thrasybulus, with whom he took part in the battle of Cyzicus. He subsequently served with Alcibiades, participating in the siege of Chalcedon in 408 B.C., and in the capture of Byzantium. After the battle of Arginusæ in 406 he repaired to Athens, and in order to exculpate himself for not saving the crews of the ships accused his colleagues of neglect, and through his testimony they were sentenced to death. In 404 B.C., when Athens was besieged by the Spartan general Lysander, Theramenes was

sent as an envoy to negotiate terms with Sparta. He purposely remained on his mission for three months, during which time Athens was reduced to dire extremity and was forced to make peace upon such terms as to place her at the mercy of the Lacedæmonians. He was elected one of the Thirty Tyrants after the peace, and at first heartily supported the measures of the government. The violent measures of Critias and his colleagues, however, induced him to form an opposing party, which rapidly increased in strength. He was accused by Critias of being a public enemy, dragged to prison, and forced to drink the hemlock.

THERAPEUTÆ, *thĕr-â-pū'tē:* pious 'Jewish' sect, mentioned in a book ascribed to Philo, as living chiefly around Lake Mareotis, near Alexandria, but as having also numerous colonies in other parts of the world. They are described in many respects like the Essenes (q.v.). Like them, they lived unmarried in a kind of monastery, were very moderate in food and dress, the latter being a white garment; prayed at sunrise, their face turned to the sun; studied much in the Scriptures—which they explained allegorically—and in other 'ancient books,' and were opposed to slavery. The chief difference between these and the Essenes, as described to us, consisted in the Therapeutæ simply living a life of contemplation, while the Essenes followed many occupations, such as agriculture, arts, etc.; the latter lived together, while the Therapeutæ lived separately in their cells; the Essenes not only took an interest in other human beings, but actively assisted them; while the Therapeutæ—who also, before they entered the brotherhood, divided their property among their relatives, contrary to the 'common treasure' of the Essenes—kept themselves in utter ignorance of the outer world. Again, the Therapeutæ knew none of the divisions which marked the degrees of initiation among the Essenes, but they held the Temple at Jerusalem in much higher veneration than the latter; the Therapeutæ brought up boys to the brotherhood, while the Essenes recruited themselves from grown-up people only. One of the chief characteristics of the Therapeutæ was their religious meal in common on every seventh Sabbath; the Essenes having two such sacred meals daily. Many and striking are the analogies offered by their mode of life and their doctrines to those of the Pythagoreans; e.g., neither partook of animal food or wine; both admitted women to their assemblies; and both held the number seven sacred. Many theories have been broached regarding this mysterious sect. One of the most plausible notions is the one—now commonly accepted—that the book *De Vita Contemplativa,* which treats of this sect, has been falsely attributed to Philo. It is believed to be the work of an early Christian, intended to idealize the life of Christian monasticism and asceticism of the first centuries. See ESSENES.

THERAPEUTICS, n. *thĕr'ă-pū'tĭks* [Gr. *therapeu'tikŏs,* having the power of healing—from *therapeu'ein,* to take care of, to heal: F. *thérapeutique;* It. *terapeutica*]: that department of medicine which relates to the discovery and application of remedies for diseases, including the action of remedies on the diseased animal system, or the means of aiding nature in return to health. THER'APEU'TIC, a. *-tĭk,* or THER'APEU'TICAL, a. *-tĭ-kăl,* curative; pertaining to the healing art. THER'APEU'TICALLY, ad. *-lĭ.* THER'APEU'TIST, n. *-tĭst,* one who studies or is versed in therapeutics.

THERAPEUTICS, that branch of medicine which deals with the treatment of disease. Nature cures; physicians treat. This is an old dogma as true to-day as it was when uttered over 2,000 years ago by a famous Greek physician. Scientists have termed that power of the human body the *vis medicatrix naturæ,* by means of which nature tends to right her own disordered organs, and it is important to recognize this all-important function of the body, and not to interfere by overzealousness in the use of potent agents with nature's own slowly acquired powers of self-restoration. An innocuous and half-hearted therapy, however, is not the logical system, even if such reconstructive powers of nature are granted. The modern conception of disease does not admit of ready characterization. In the articles on disease and pathology (q.v.) it is attempted to define what is meant by disease, but such definitions are far from being satisfactory because of the immense variety of diseased conditions, their manifold causation, and their devious progressions. In all disease certain groups of physiological functions are altered, and in the attempt to aid nature to bring these disturbed physiological activities to a normal condition the chief work of the therapeutist lies. It makes little or no difference what the agencies may be that are used—often, as has been said, none are necessary—yet the ideal of the therapeutic art is to restore to normal condition, as far and as quickly as possible, the disturbed bodily functions. While it is true that the physician of to-day employs many of the agents used by physicians thousands of years ago, there is a far greater precision and a much more comprehensive series of ideas concerned in their use by the well-equipped modern therapeutist than was possible to his early predecessors. The one aim of the physician throughout the centuries has been the alleviation of suffering and the restoration of the diseased to health or to comfort; and notwithstanding the many small cliques and divergences of opinion, the progress toward scientific therapeutics has been steady and increasingly satisfactory. At the outset of this summary of therapeutics it may be well to consider for a moment the different classes of agents at hand by the use of which, singly or combined, the physiological functions of the body may be modified, and thus be made useful in the healing art.

THERAPEUTICS.

Expressed categorically, the different therapeutic agents or systems are: (1) Suggestion-therapy; (2) Dietotherapy; (3) Physicotherapy; (4) Mechanotherapy; (5) Pharmacotherapy; (6) Surgicotherapy. Each of these will be briefly discussed.

Unquestionably the oldest and yet youngest therapeutic agent is suggestion. The power to heal by faith is not the special property of any sect or class, nor the exclusive right of any system. Belief in gods and goddesses, prayer to idols of wood, of stone, of gossamer fiction, faith in the doctor, belief in ourselves engendered from within or from without—these are all expressions of the great therapeutic value for healing that resides in the influence of mental states on bodily functions. These will not move mountains; they cannot cure consumption; they do not influence a broken leg, nor an organic paralysis; but suggestion, in its various forms, may be and is one of the strongest aids to all therapeutic measures. Of its abuse by designing hypnotists, blackmailers, clairvoyants, and a motley crew of parasites, space does not permit particularization. The human mind is credulous—it believes what it wants or wills to believe; and the use of suggestion in therapeutics is one of great power for good and for evil.

The treatment of disease by diet constitutes another large branch of the therapeutic art. Modern chemistry has resolved all foods and drinks into their elements, and has given the physician valuable aids in the treatment of a large number of diseases. Many obscure disorders, such as diabetes, gout, myxœdema, obesity, etc., are closely allied with certain defects in the metabolism of certain physiological systems of the body. Many of these are best treated by a dietary regimen, combined, it may be, with other means. Many of the minor disorders of the digestive tract (see DIGESTION) are best treated by regulation of the diet.

By physicotherapy is meant the use of certain physical agents such as heat, cold, light, electricity, etc. Certain forms of application of the agents are termed (a) hydrotherapy (q.v.), in which heat and cold are applied by means of water; (b) phototherapy (q.v.), in which light is used in the treatment of disease. Sunlight, electric light, ultra-violet rays (Finsen's light), X-rays, radioactive substances—these all exert on the tissues of the body certain influences that, properly applied, may bring about restoration of disordered functions, and thus aid nature in curing disease.

Mechanotherapy is the use of mechanical movements in treatment. Massage, vibration, gymnastics, Swedish movements, etc., are some of the different forms in use. Under the name of osteopathy (q.v.) it is attempted to elevate one of the oldest aids to treatment, in use by the Greeks, Chinese, etc., to the rank of an exclusive system. Osteopathy is mechanotherapy carried to an extreme.

Under the terms pharmacotherapy and surgicotherapy

are included the treatment of disease by drugs, so-called, and by surgical means. So far as treatment by means of drugs is concerned, it is interesting to note that practically all drugs act on the tissues of the body in some chemical or physicochemical manner. They may have a certain selective action on certain tissues of the body. Thus the large group of the alcohols, comprising ethers, aldehydes, chloroform, hypnotics—such as trional, sulphonal, veronal, urethane, and a large number of others —have a selective action on the nervous tissues of the brain, benumbing their activities and causing drunkenness, or anæsthesia, or sleep, according to the dose or other conditions. Others act on sensory nerves, diminishing pain; such as cocaine, opium, antipyrine, acetanilid, phenacetine, cannabis, etc. Again, other remedies act chiefly on the intestines, giving the large group of cathartics; and so the entire list of drugs might be analyzed. Given a knowledge of the selective or generalized action of the drugs, the power that they may exert in correcting abnormal physiological activities is solely a matter of application, and in accordance with the correct interpretation of the cause of the disturbed functions will the therapeutic application be of direct value or not. In other words, drugs are nothing more than chemical agents which may be used to modify certain physiological activities; if by their well-known power in modifying these activities other morbid activities may be corrected, they are agents for good.

One other phase of therapeutics remains to be considered. It has been pointed out that nature has resources of her own for overcoming certain types of disease. Can these natural powers be so played upon or affected as to increase their operation? Along this line new paths have been opened up since the recognition of a large class of diseases known as infectious. Bacteriology (q.v.) has taught that disease organisms (bacteria) cause the disturbance (disease) in the body not so much by their physical presence as by the extremely virulent poisons that they form. It is the struggle of the human body to get rid both of bacteria and poisons that makes the disturbance which is called the disease. Thus the diarrhœa of typhoid is one of nature's efforts to throw off poisons; the high temperature and crisis of pneumonia (q.v.) is a supreme effort of the body, which sometimes succumbs under it, to deal a death-blow to the pneumococcus, the micro-organism that causes the disease. The high temperature in malaria (q.v.) unquestionably kills off a great many of the parasites in the blood.

But in addition to these larger and more palpable efforts on the part of nature to overcome the invader, a series of subtle and intricate defenses are at work in the blood-serum, some of the elements of which are known. Thus in some diseases there is elaborated in the blood-serum a direct chemical antidote, an antitoxin, to the poisons of the invading bacteria. Such a protective

power is found in diphtheria (q.v.). Vaccination, the discovery of which was almost the result of an accident, is a form of serum treatment. The details of the reasons why immunity is conferred by the modified smallpox of the cow are not yet known, as the true cause of smallpox is not indubitably proven, but the time is not far off when the different factors therein will be unearthed. A large number of other questions are concerned in this great question of natural and acquired immunity (q.v.).

Human progress has been likened to the advance of a drunken man, and it is certain that the ups and downs, and side-lurches, and backward steps in the path of therapeutics have been many; but withal there has been a broad blaze of progress. That which has been tried and been found to be true, has been grasped and has become the heritage of the whole community. The physician class have shared with the people at large in the general movements; there have been many side-tracks from the broad road of therapeutics; innumerable *pathies* have had their little day or their 100 years; each in its turn has contributed what kernel of truth it possessed to the progress of the mass.

Consult: Bernheim, *Suggestive Therapeutics—Dietetics;* Hutchinson-Thompson, *Physicotherapy, Mechanotherapy;* Cohen, *System of Physiologic Therapeutics—Pharmacotherapy;* Brunton, *The Action of Medicines;* Cushny, *Pharmacology and Therapeutics;* Schmiedeberg, *Arzneimittellehre; Surgery;* Mikulicz-Bruns, edited by W. T. Bull, *Immunity;* Roger, *Infectious Diseases;* Ehrlich, *Seitenkettetheorie;* Vaughan and Novy, *Cellular Toxins.*

THERAPONIDÆ, *thĕr-a-pŏn'ĭ-dē:* a family of acanthopterous fishes, allied to *Percidæ,* from which they are distinguished by having 6 instead of 7 branchiostegal rays. The scales in some are ctenoid, in other cycloid. Some are fresh-water fishes. Some are found in the lakes and rivers of N. America.

THERE, ad. *thăr* [AS. *thær;* Icel. *thar;* Dan. and Sw. *der;* Dut. *daar,* there]: in that place; in the place most distant; opposite to *here,* in this place; a word used as a mere introductory particle at the beginning of a sentence, adding to it a peculiar and idiomatic emphasis, which can hardly be explained; *there* serves to throw the nominative after the verb, as 'a man was,' '*there* was a man'; in composition, *there* has the force of *that,* as *thereby,* which means 'by that.' THERE'ABOUT, ad. *-ă-bowt,* or THERE'ABOUTS, ad. [*there,* and *about*]: near that place; near that number or degree; concerning that matter; approximately. THEREAFTER, ad. *-ăf'tĕr* [*there,* and *after*]: according to that; accordingly. THEREAT', ad. *-ăt'* [*there,* and *at*]: at that; at that thing or event. THERE'BY, ad. *-bī* [*there,* and *by*]: by that means; in consequence of that. THEREFOR', ad. *-fŏr',* for that; for this; for it. THEREFORE, ad. and conj. *thĕr'fŏr* [*there,*

and *for*]: for that or this reason; referring to something previously stated; consequently; in return for this or that. THEREFROM, ad. *thăr-frŏm'* [*there,* and *from*]: from this or that. THEREIN', ad. *-ĭn'* [*there,* and *in*]: in that or this place, time, or thing. THEREINTO', ad. *-ĭn-tô'* [*there,* and *into*]: in to that, or that place. THEREOF', ad. *-ŏf'* [*there,* and *of*]: of that or this. THEREON', ad. *-ŏn'* [*there,* and *on*]: on that or this. THEREOUT', ad. *-owt'* [*there,* and *out*]: out of this or that. THERETO', ad. *-tô'* [*there,* and *to*], or THEREUNTO', ad. *-ŭn-tô'*, to that or this. THEREUPON', ad. *-ŭp-ŏn'* [*there,* and *upon*]: upon that or this; in consequence of that; immediately. THEREWITH', ad. *-wĭth'* [*there,* and *with*]: with that or this; forthwith. THEREWITHAL', ad. *wĭth-awl'*, over and above; with that or this.

THEREANENT, ad. *thăr'a-nĕnt* [Scot.]: concerning that; as regards or respects that matter or point.

THERE'SA, SAINT. See TERESA.

THERESIOPEL, *tā-rā-zē-ō'pĕl,* usually MARIA-THERESIOPEL (Hung. *Szabadka*): important town in the Hungarian county of Bacs, 24 m. w.s.w. of Szegedin, on the Palitsch Lake. It is well built, but unpaved; contains numerous important buildings, as the churches, gymnasium, and the great barracks. Manufactures of leather and shoes, linen-weaving, dyeing, cultivation of tobacco and fruits, with rearing of cattle, are chief industries. Pop. (1900) 82,122.

THERIACA, n. *thē'rĭ-ă-kă* [L. *thērĭăca; Gr. thērĭăkē,* an antidote against the bite of serpents, or poison—from *thērĭŏn,* a wild beast]: *formerly,* a medical remedy for the bite of serpents, or for poison; medical name for molasses or treacle [the Eng. word treacle is a corruption of *theriacal,* which had come to mean medicinal—treacle being named from its resemblane in appearance to the theriaca of Andromachus]. THERIACA ANDROMACHI, *ăn-drŏm'ă-kē,* familiarly known as Venice treacle, an electuary of about 70 ingredients, invented by Andromachus of Crete, physician to Nero, in repute till recently —so that not many years ago in Venice, Holland, France, and other countries, druggists had to prepare the compound with solemnities in the presence of the magistrates.

THERIAKIS, n. plu. *thē'rĭ-ă-kĭz:* the opium-eaters of Turkey.

THERIODONT, n. *thēr'ĭ-ō-dŏnt* [Gr. *thēreĭ'ŏs,* savage —from *thēr,* a wild beast; *odous,* or *odonta,* a tooth]: in *palæon.,* one of an extinct order of reptiles, named in allusion to the mammalian character of their teeth.

THERMÆ, *thĕr'me:* properly warm baths, but also applied generally to the baths of the ancients. During the Roman Empire the buildings for this purpose were constructed with great splendor. The baths of Nero, Titus, Caracalla, and Diocletian at Rome were distinguished for magnificence and luxury.

THERMAL, a. *thėr'măl*, sometimes THER'MIC, a. *-mĭk* [Gr. *thermos*, warm—from *therō*, I warm: F. *thermal*; It. *termale*]: of or pertaining to heat; warm—applied to springs above 60° Fahr. THERMAL CAPACITY, the amount of heat required to increase the temperature of a body one degree. THERMAL EFFICIENCY, the ratio of the heat converted by an engine into mechanical energy, and the heat absorbed by it from the source of supply. It is limited by the range of temperature through which the working substance within the cylinder acts, and must be always a quantity less than unity.

THERMIC FEVER, *thėr'mĭk*; popularly SUNSTROKE (otherwise called *Heat Apoplexy, Heat Asphyxia, Heat-stroke, Erythismus tropicus*, and *Insolatio*): depression of the vital forces due to the action of intense heat of the atmosphere long continued, or of the direct rays of the sun. The symptoms are greatly modified in different cases. In some there is tendency to fainting (*Heat Syncope*); in others the symptoms are apoplectic (*Heat Apoplexy*): in still others the characteristic feature is the excessive development of the body heat (*Hyperpyrexia*) to 110° F. or higher. In the first case (syncope), there is danger of heart-failure, and the patient should be laid in recumbent position, stimulants administered, and friction of the extremities applied. But where the symptoms are rather those of apoplexy or of hyperpyrexia, the most successful results are obtained by employment of cold (pouring cold water over the bodily surface, rubbing the surface with ice, injection of iced water). The preventive measures are more important than the treatment, and are: wearing loose clothing; personal cleanliness by frequent cool bathing; avoidance of all excesses; drinking cooled water in small quantities at frequent intervals. In the cases that terminate favorably, gradual remission of the symptoms takes place; and when the skin becomes cool and moist, and sleep has been procured (usually within 36 hours of the attack), the patient may be regarded as out of danger.

THERMIDOR, n. *thėr'mĭ-dŏr* [F.—from Gr. *thermos*, warm]: eleventh month of the calendar of the first French republic, from July 19 to Aug. 18 (see CALENDAR). The 9th Thermidor of the republican year 2 (1794, July 27) is historically memorable as the date of Robespierre's fall, and the end of the Reign of Terror (q.v.). The name Thermidorians was given to all those who took part in this fortunate *coup d'état*, but particularly to those desirous of restoring the monarchy.—See Duval's *Souvenirs Thermidoriens* (2 vols. Par. 1844).

THER'MIT: a name given by Goldschmitt to a mixture of fine aluminium filings or powder and iron oxide. When this mixture is ignited by some suitable means the aluminium unites vigorously with the oxygen of the iron oxide, forming a very pure variety of steel and a

slag consisting mostly of aluminium oxide. This union of finely divided aluminium with oxygen gives use to a very intense heat, 3,000° C. Besides the ordinary thermit (iron oxide and aluminium filings) other mixtures may be prepared from aluminium and the oxides of nickel, cobalt, chromium, manganese, etc. When these are ignited in a properly prepared crucible violent reaction takes place, the oxygen of the oxide being taken up by the aluminium, leaving a very pure metal, nickel, cobalt, etc. When ordinary thermit is ignited the temperature produced is so high that the iron and the slag are left in a molten and highly heated condition. If this iron is allowed to flow on to another piece of iron or steel it will heat it enough to soften it and the whole will harden to a homogeneous mass. In this way it can be used to replace broken parts of machinery, to mend broken or cracked propeller shafts, to weld together railroad rails so as to form one continuous rail, etc. Some of the important features in this process are its cheapness, ease of execution, and the fact that machinery, etc., can be repaired in position. Iron tubes can be welded together by placing the ends in a mold and allowing the thermit product to flow in in such a way that the liquid slag first comes in contact with the tubes. The slag forms a protective covering which prevents the hot iron from uniting with them, though it does allow the tube ends to become hot enough to unite as one piece.

THERMO, *thėr'mō* [Gr. *thermos,* warm]: common prefix in many scientific terms, denoting 'connected with or derived from heat.' THERMO-DYNAMICS, branch of physical science dealing with the conversion of heat into energy, and of energy into heat (see below). THERMO-ELECTRICITY, electricity developed by the unequal heating of metallic substances; branch of the science of electricity which treats of the currents that arise from heating the junction of two heterogeneous conductors (see ELECTRICITY). THERMO-ELECTROMETER. instr. for ascertaining the dissimilar heating power of an electric current.

THERMOBAROMETER, *thėr-mō-bă-rŏm'ĕ-tėr* [Gr. *thermos,* warm, and *barometer*]: instrument for measuring altitudes according to the boiling-point of water. It consists of a metallic vessel for boiling water, fitted with very delicate thermometers graduated only from 80° to 100° centigrade (176°—212° F.); so that each degree occupying considerable space on the scale, even hundredths of a degree may be noted: thus it is possible to determine the altitude of a given place within about 10 ft.—The name thermobarometer is given also to a form of siphon barometer having its two wide legs united by a narrow tube. when this barometer is placed in reversed position it serves as a thermometer, the sealed leg acting as the bulb of a thermometer.

THERMO-DYNAMICS, *thĕr'mō-dī-năm'ĭks*, or the DYNAM'ICAL THEORY OF HEAT: literally, merely the science of the relations of heat and work; but often generally denoting the whole science of Energy: see ENERGY: FORCE: WORK. The following is an outline of this grand modern generalization, mostly supplementary to that in the article above referred to.

Energy is strictly defined as the power of doing Work (q.v.), and is of one or other of two kinds—*Potential* or *Kinetic*. A raised weight, a wound-up spring, gunpowder, and the food of animals, are instances of stores of potential energy. A missile in motion, wind, heat, and electric currents are instances of kinetic energy. Sound, light, and other forms of wave-motion (see WAVE), all are instances of mixed potential and kinetic energy.

The modern theory of Energy contemplates its

CONSERVATION,
TRANSFORMATION, and
DISSIPATION.

The phrase CONSERVATION OF ENERGY is the statement of the experimental fact, that Energy is, like Matter (q.v.), indestructible and uncreatable by any process at the command of man. See DYNAMICS.

The phrase TRANSFORMATION OF ENERGY (or Correlation of Forces or Energies) is the statement of the experimental fact, that any one form of energy may in general be transformed wholly or partially into any other form. But it is subject to the condition derived from the first fact, that the portion transformed retains its amount unchanged. It is subject also to the law of DISSIPATION, or Degradation, which is a statement of the experimental fact, that Energy generally tends at every transformation to at least a partial transformation into heat; and that, when in that form, it tends to a state of uniform distribution, in which no further transformation is possible.

The original energy of the universe, therefore, though still of the same amount as at creation, being in a state of ceaseless transformation, has been in great part frittered down into heat, and will at length take wholly that final form.

In the grand discoveries here briefly summarized, Newton took the first great step. In a Scholium to his third law of Motion (q.v.), he lays down in a few words the Conservation of Energy as embodying the experimental results known in his day with reference to forces and visible motions. Near the end of the 18th c. Rumford (q.v.) and Davy (q.v.) attempted to determine the 'Mechanical Equivalent' of heat—i.e., the quantity of heat equivalent to a given amount of mechanical work. But though the Dynamical Theory of Heat was thus really founded in 1799, it was not generally received. The first to recall attention to it was Séguin, nephew of Montgolfier (from whom he states that he derived his views), who 1839 distinctly enunciated the equivalence of heat and mechanical work. In 1842, Mayer enunciated the Conservation of Energy as a metaphysical deduction from the maxim, *Causa æquat effec-*

sum. He made no experiments to prove this general statement, but he made a calculation of the mechanical equivalent of heat from the specific heats of air—assuming that when heat is produced by compression, its amount is the equivalent of the work spent in compressing. His result was erroneous because his data were imperfect. But it appears that his assumption, quite unwarranted as it was, is really very nearly true for air. In 1843, Colding, led also by some metaphysical speculations, propounded the doctrine, but endeavored to base it on actual experiments.

Finally, Joule (q.v.), 1843, published an experimental determination of the mechanical equivalent of heat (770 foot-pounds as the work required to heat a pound of water one degree F.), which is within two per cent. of the most trustworthy results since obtained (772 foot-pounds). Joule had been, since 1840 at least, making quantitative determinations of equivalence between various forms of energy; and was led to propound the general law of Conservation of Energy by the only legitimate process—viz., experiment, as contrasted with metaphysical assertions of what ought to be. The complete foundation of the science on a proper basis is thus due to him; though, as we have seen, portions of it were established thoroughly by Newton, by Rumford, and by Davy.

Before we consider the principal features of the theory as now developed, it is necessary to refer to the investigations of Fourier and Carnot, which, though in some respects defective, were real advances. Fourier's great work, *Théorie de la Chaleur*, is devoted to the laws of conduction and radiation, i.e., to the dissipation of heat, and is one of the most remarkable mathematical works ever written. Carnot's work, *Sur la Puissance Motrice du Feu*, is the first in which any attempt is made to explain the production of work from heat. It is unfortunately marred by his assumption that heat is a material substance, though it is only fair to say that he expresses doubt of this hypothesis.

(The following notice of Carnot is from a paper by Sir W. Thomson (q.v.) in *Transactions of the Royal Society of Edinburgh*, 1849.)

He begins his investigation by premising the following correct principle, neglected by many subsequent writers: 'If a body, after having experienced a certain number of transformations, be brought identically to its primitive physical state as to density, temperature, and molecular constitution, it must contain the same quantity of heat as that which it initially possessed.' Hence he concludes, that when heat produces work, it is in consequence of its being *let down* from a hot body to a cold one, as from the boiler to the condenser of a steam-engine. His investigation, though based on an erroneous hypothesis, is extremely ingenious, and forms the foundation of the modern theory. In this sketch of it, preparatory to an account of the present state of the theory, a somewhat hypothetical case is chosen, as simpler than the most common practical one. This is the case of a piston working air-tight in a cylinder closed at the bottom.

Suppose we have two bodies, A and B, whose temperatures, S and T, are maintained uniform, A being the warmer body, and suppose we have a stand, C, which is a non-conductor of heat. Let the sides of the cylinder and the piston be also non-conductors, but let the bottom of the cylinder be a perfect conductor; and let the cylinder contain a little water, nearly touching the piston when pushed down. Set the cylinder on A; then the water will at once acquire the temperature S, and steam at the same temperature will be formed, so that a certain pressure must be exerted to prevent the piston from rising. Let us take this condition as our starting-point for the cycle of operations. 1. Allow the piston to rise gradually; work is done by the pressure of the steam, which goes on increasing in quantity as the piston rises, so as always to be at the same temperature and pressure. And *heat is abstracted from A*, namely, the latent heat of the steam formed during the operation. 2. Place the cylinder on C, and allow the steam to raise the piston further. More work is done, more steam is formed, but the temperature sinks on account of the latent heat required for formation of the new steam. Allow this process to go on till the temperature falls to T, the temperature of the body B. 3. Now, place the cylinder on B; there is of course no transfer of heat; because two bodies are said to have the same temperature when, if they be put in contact, neither parts with heat to the other. But if we now press down the piston, we do work on the contents of the cylinder, steam is liquefied, and the latent heat developed is at once absorbed by B. Carry on this process *till the amount of heat given to B is exactly equal to that taken from A* in the first operation, and place the cylinder on the non-conductor C. The temperature of the contents is now T., and the amount of caloric in them is precisely the same as before the first operation. 4. Press down the piston further, till it occupies the same position as before the first operation; additional work is done on the contents of the cylinder, a further amount of steam is liquefied, and the temperature rises.

Moreover, *it rises to S exactly*, by the fundamental axiom, because the volume occupied by the water and steam is the same as before the first operation, and the quantity of caloric that they contain is also the same—as much having been abstracted in the third operation as was communicated in the first—while in the second and fourth operations, the contents of the cylinder neither gain nor lose caloric, as they are surrounded by non-conductors.

Now, during the first two operations, work was done by the steam on the piston; during the last two, work was done against the steam; on the whole, the work done by the steam exceeds that done on it, since evidently the temperature of the contents, for any position of the piston in its ascent, was greater than for the same position in the descent, except at the initial and final positions, where it is the same. Hence the pressure also was greater at each stage in the ascent than at the corresponding stage in the descent; from which the theorem is evident.

Hence, on the whole, a certain amount of work has been communicated by the motion of the piston to external bodies; and the contents of the cylinder having been exactly restored to their primitive condition, we are entitled to regard this work as due to the caloric employed in the process. This, we see, was taken from A, and wholly transferred to B. It thus appears that *caloric does work by being let down from a higher to a lower temperature.* And evidently, if we knew the laws which connect the pressure of saturated steam, and the amount of caloric that it contains, with its volume and temperature, it would be possible to apply a rigorous calculation to the various processes of the cycle above explained, and to express by formulæ the amount of work gained on the whole in the series of operations, in terms of the temperatures (S and T) of the boiler and condenser of a steam-engine, and the whole amount of caloric which passes from one to the other.

Though the above process is exceedingly ingenious and important, it is to a considerable extent vitiated by the assumption of the materiality of heat which is made throughout. To show this, it is necessary only to consider the second operation, where *work is supposed to be done* by the contents of the cylinder expanding *without loss or gain of caloric*, a supposition which our present knowledge of the nature of heat shows to be incorrect. But it is quite easy, as seems to have been remarked first by James Thomson in 1849, to put Carnot's statement in a form rigorously correct, whatever be the nature of heat. James Thomson says: 'We should not say, in the third operation, "compress till the same amount of heat is given out as was taken in during the first." But we should say, "compress till we have let out so much heat that the further compression (during the fourth stage) to the original volume may give back the original temperature."' It is to be remembered, however, that Carnot was not satisfied with his caloric hypothesis.

If we carefully examine the above cycle of operations, we easily see that they are *reversible*, i.e., that the transference of the given amount of caloric back again from B to A, by performing the same operations in the opposite order, requires that we expend on the piston, on the whole, as much work as was gained during the direct operations. This most important idea is due to Carnot, and from it he deduces his test of a *perfect* engine, or one which yields from the transference of a given quantity of caloric from one body to another (each being at a given temperature) the greatest possible amount of work. And the test is simply that the *cycle of operations must be reversible.*

To prove it, we need only consider that, if a heat-engine, M, could be made to give more work by transferring a given amount of caloric from A to B, than a reversible engine, N, does, we may set M and N to work in combination, M driven by the transfer of heat, and in turn driving N, which is employed to restore the heat to the source. The compound system would thus in each

cycle produce an amount of work equal to the excess of that done by M over that expended on N, without on the whole any transference of heat; which is of course absurd.

The application of the true theory of heat to these propositions was made 1849, 50, and 51 respectively, by Rankine, Clausius, and Sir W. Thomson. Rankine employed a hypothesis as to the nature of the motion of which heat consists, from which he deduced many valuable results. Clausius supplied the defects of Carnot's beautiful reasoning; accommodating it to the dynamical theory by a very simple change, and evolving a great number of important consequences. But by far the simplest, though the most profound, writings on this subject, are those of Sir W. Thomson, in *Transactions of the Royal Soc. of Edinburgh*: see these: also Tait's *Thermo-Dynamics.*

In its new form, thermo-dynamics is based on the two following laws:

Law I. (Davy and Joule.) *When equal quantities of mechanical effect are produced by any means whatever from purely thermal sources, or lost in purely thermal effects, equal quantities of heat are put out of existence, or are generated.*

Law II. (Carnot and Clausius.) *If an engine be such that, when it is worked backward, all the physical and mechanical agencies in every part of its motions are reversed, it produces as much mechanical effect as can be produced by any thermo-dynamic engine, with the same temperatures of source and refrigerator, from a given quantity of heat.*

The proof of this second law differs from that of Carnot (given above as regards reversible engines) by being based no longer on the supposition of the materiality of heat, but on the following axiom, in some of its many possible forms—It is impossible, by means of inanimate material agency, to derive mechanical effect from any portion of matter by cooling it below the temperature of the coldest of the surrounding objects. It will be easily seen that the pair of engines (one reversible) before mentioned would, if worked in combination, form a perpetual motion; and, besides, would constantly transfer heat from a colder to a warmer body.

One of the immediate and most important deductions from these principles is—that only a fraction of the heat employed in any engine is converted into useful work (the remainder being irrecoverably lost). This fraction was shown by Thomson to be capable of expression as

$$\frac{S - T}{S};$$

where S and T are the temperatures of the source and condenser, *measured from the absolute zero* of temperature: see HEAT. Thus, an air-engine, in which a far greater range of temperature can be safely used than in a steam-engine, employs effectively a much larger portion of the heat supplied to it; and there is no doubt that air-engines would supersede steam-engines, if we could get a material capable of enduring the great heat required.

THERMOMETER, n. *thĕr-mŏm′ĕ-tĕr* [Gr. *thermos*, warm; *metron*, a measure]: literally 'heat-measurer,' an instr. for measuring the degree of heat or temperature of bodies by the regular expansion of mercury, or of some other substance confined in a graduated glass tube: see CENTIGRADE: FAHRENHEIT: RÉAUMUR. THERMOMETRIC, a. *thĕr′mō-mĕt′rĭk*, or THER′MOMET′RICAL, a. *-rĭ-kăl*, pert. to a thermometer; made or ascertained by a thermometer. THER′MOMET′RICALLY, ad. *-lĭ*. THERMOM′ETRY, n. *-ĕ-trĭ*, the art of constructing thermometers. THERMOMET′ROGRAPH, n. *-rō-grăf* [Gr. *graphō*, I write]: a self-registering thermometer, for registering maximum and minimum temperatures.—The *Thermometer* is an instrument which measures temperature (see HEAT) by the *expansion* of bodies. Its early history is obscure. There are various claimants for a share at least in its invention, and their testimony agrees approximately in referring it to the beginning of the 17th century.

In the ordinary spirit-T., as it is called, indications are given by the expansion of a quantity of alcohol which entirely fills a glass bulb, and partially a narrow tube attached to it.

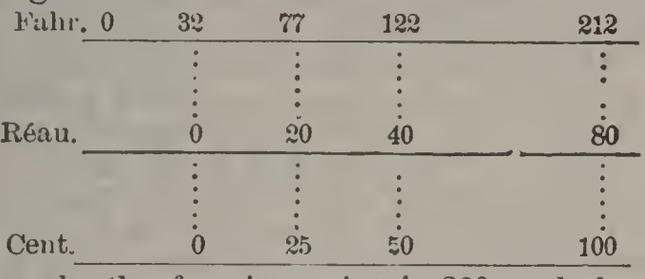
To construct such an instrument, a capillary tube of as uniform a bore as possible is selected. The easiest method of testing its uniformity is to introduce a column of mercury, about an inch long, into the tube, and gradually move it along by inclining the tube, carefully measuring the length of the column in each of its successive positions: it is obvious that the column will be longer the smaller is the mean section of the portion of the tube occupied at any time by the drop of mercury. If considerable differences of length are found, the tube is rejected at once. The best tubes are those which, if showing any change, taper very slowly but nearly uniformly from one extremity to the other; a defect which can easily be allowed for in the subsequent graduation of the instrument. A bulb is blown on one end of the selected tube; large, if the instrument is meant to be very delicate; small, if a common instrument is to be made, or one which will work through a great range of temperature. The bulb is heated to expand the contained air, and then the open end of the tube is plunged into alcohol, usually tinged with coloring matter, for greater visibility. As the bulb cools, the atmospheric pressure on the alcohol in the vessel forces some of it into the stem, and perhaps a little into the bulb. The tube being then inverted, a few dexterous taps suffice to shake the greater part of the alcohol into the bulb. The lamp is again applied, with caution, until the alcohol boils, and the rapidly escaping vapor drives the air almost entirely from the tube, whose open end is immediately plunged again into the colored spirit. Unless the stem be nearly 40 ft. in length—and thermometers have been made by Forbes (q.v.) of length approaching to this for measurement of underground temperature—the alcohol fills the whole of the ball and stem as soon as the glass has cooled. The bulb is again cautiously heated so that, by the expansion of the spirit,

such a portion may be expelled, that when the whole has again cooled, the level of the liquid in the tube may stand near some point previously determined with reference to the particular adaptation of the instrument. Finally, the lamp being again applied to the tube, near the upper surface of the liquid, that portion of the spirit is again made to boil; and while the vapor keeps the free end of the tube clear of air, that end is hermetically sealed; and the glass-blower's part of the work is done. A somewhat similar, but more difficult process is requisite if other liquids, e.g., mercury, ether, sulphuric acid, etc., are employed to fill the bulb, each of these liquids having its own special use in certain philosophical inquiries. It remains only that the instrument be *graduated*, so that definite information may be given by its indications.

In the older thermometers, the scale was arbitrary, so that no comparable readings could be taken by means of different instruments. In the finest modern instruments, also, the scale is usually quite arbitrary, being, in fact, engraved on the tube during the process of calibration above described. But then, by careful observation, certain definite temperatures are measured in terms of this arbitrary scale, so that the value of a degree and the position of some definite zero-point are determined for it, and the result engraved on the tube. These numbers enable us, by an easy calculation, to reduce the observed reading of the fine instrument to its equivalent in some of the standard scales.

At present, we assume, what is very nearly true for mercury at least, that equal increments of bulk correspond to equal increments of temperature. All, then, that is necessary is to fix two definite temperatures, and assign their positions on our scale. Water being one of the most common bodies in nature, and being almost everywhere easily obtainable in purity, is usually employed; and its *freezing* and *boiling* points are taken as the definite points. The temperature of freezing water or of melting ice is almost absolutely fixed, for (see HEAT) pressure alters it only very slightly. It is otherwise with the boiling point of pure water, for this is considerably raised by increase of pressure; so much so, in fact, that if the barometer be not attended to, an error of several degrees is possible. Hence we must define the particular pressure, usually 30 inches, at which the boiling-point is to be determined. The T., constructed (so far) as above described, is to have its bulb, and nearly the whole of the portion of the stem which contains liquid, immersed in pounded ice, from which the melted portion is freely trickling: and when the level of the spirit has become stationary, its position, the *freezing-point*, is marked on the tube. Similarly, the barometer standing at 30 inches, the bulb is inclosed in the steam immediately above the surface of water freely boiling: the *boiling-point* is thus obtained. It remains only to decide by what numbers these points shall be indicated, because (on account of the nearly uniform expansion of mercury) then the remaining divisions can be at once filled in by dividing the interval between them into equal parts, or, if necessary, allow-

ing for a slight taper in the tube. The only scales which require mention are those of Fahrenheit (F.), Réaumur (R.), and Celsius (C.). Of these, the first is commonly used in the United States and Great Britain, the second in Germany, the third in France; but the third, under the name *Centigrade* scale, is almost exclusively used by scientific men of all nations. The relations of these scales are shown by the following figure:



In the F. scale, the freezing-point is 32°, and the boiling-point 212°, so that the space between these is divided into 212 — 32, or 180, equal parts or degrees. In the others, the freezing-point is the zero, but the boiling-point is 80° and 100° respectively. It is of course easy to reduce from one of these scales to another. Thus—What is the C. reading for 77° F.? (see the dotted line in the figure). The numbers in Fahrenheit's scale all are too great by 32, because 32°, and not 0°, stands for the freezing-point: subtract this 32 from 77, and we have 45. Hence the required number of C. degrees must bear the same ratio to the 100 from freezing to boiling in that scale that the 45 bears to the 180 degrees between the same limits in F.: the requisite number is therefore

$\frac{45}{180}\,100 = 25°$ C. In words—*To convert Fahrenheit to Centigrade, subtract* 32, *and multiply by* $\frac{100}{180}$, *or* $\frac{5}{9}$. Vice versa—*To pass from Centigrade to Fahrenheit, multiply by* $\frac{9}{5}$, *and add* 32. Thus the F. value of 50 C. is $\frac{9}{5}50 + 32 = 122$, as in the figure. Similar processes apply to the R. scale.

It is supposed that Fahrenheit fixed his zero probably by means of a freezing mixture, such as snow and salt, or sal-ammoniac. It is much to be desired that the C. scale alone were employed.

A mercurial T. ceases to be of use for temperatures only a little above the freezing-point of mercury; but it has a wide range upward, as mercury does not boil till about 600° C. On the other hand, a spirit-T., though of little use beyond about 50° or 60 C., as alcohol boils at 70° C., is useful for any degree of cold yet produced, as alcohol has never yet been frozen. When extreme sensitiveness is required, ether, being considerably more expansible than alcohol, is sometimes employed; as by Thomson in detecting the effect of pressure on the freezing-point of water. Water would be about the worst substance with which a T. could be filled; for besides its expanding in the act of

freezing, and therefore necessarily bursting the instrument if it were ever allowed to reach the freezing-point, its scale would read partly backward and partly forward; for as ice-cold water is gradually heated up to 4° C., it contracts, and begins to expand again after that limit has been passed.

To make thermometers self-recording, various schemes have been proposed. Those most in use indicate only the *maximum* and *minimum* temperature during each 24 hours; or during the interval which has elapsed since they were last set. The usual arrangement consists of two thermometers, a mercurial and a spirit one, fixed horizontally to the same frame, with their bulbs at opposite ends of the frame. Above the mercury is a small piece of steel or ivory, and *in* the spirit a small and light float of glass or enamel. Capillary forces prevent the steel from entering the mercury, and the enamel from leaving the spirit. As the mercury expands, it pushes the steel before it, and when it again contracts, it leaves it behind; the end nearest the mercury thus remaining at the highest or maximum indication which that T. has given. In the spirit-T., the liquid, as it expands, freely passes the enamel, and leaves it undisturbed; but it can never contract so as to leave it dry. It therefore pulls the enamel back when it contracts, and thus the extremity furthest from the bulb marks the lowest point which the spirit has reached, or the minimum temperature. To set this instrument, incline it so that the steel falls back to the surface of the mercury —the enamel at the same time comes to the surface of the spirit.

The best mode of registration is undoubtedly the photographic. For this purpose, a mercurial T. is placed vertically before a narrow slit, in such a way that no light can pass through the slit except above the level of the

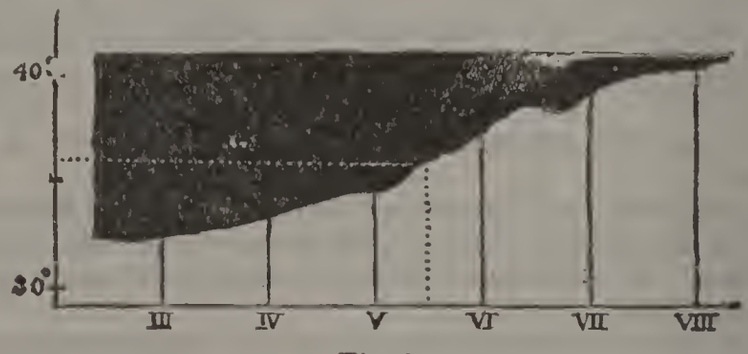


Fig. 1.

mercury in the tube. A gas flame is kept burning at some distance in front of the slit, the bulb of the thermometer being protected from its radiation; and behind the slit, a sheet of prepared photographic paper is exposed to the narrow line of light which passes above the mercury. This paper is fixed on a cylinder with vertical axis, which is made to revolve uniformly by clockwork. Lines are drawn by the clockwork on the paper, giving the position of the slit at each hour of the 24, or the gas-flame is mechanically reduced or eclipsed at intervals of an hour:

so that the record, when photographically developed, gives the temperature for every minute of the day and night, in a form represented above; where the blackened space represents the portion of the paper which has been exposed to the light. To find from such a record what was the temperature at any hour, say 5 hours 30 minutes A.M., draw a vertical (dotted) line, as in the figure, half-way between the V and VI lines, and from the point where it meets the dark space, draw a horizontal (dotted) line. This intersects the scale (to the left in the figure) at 36°, the temperature required.

Among ordinary meteorological instruments is the *wet-bulb T.*—simply an ordinary T., with the bulb covered with paper or cotton-wool, kept constantly moist by the capillary action of a few fibres connecting it with a small vessel of water. If the air be *saturated* with moisture (see DEW: EVAPORATION), there will be no evaporation, and the wet-bulb T. will give the same indication as the dry-bulb. But the drier and the warmer the air is, the faster does the water evaporate, and (the latent heat of vaporization being mainly taken from the moist bulb) the lower does the mercury sink in the moist-bulb instrument. The difference betwen the readings of the two instruments, compared with the actual temperature, as shown by the dry-bulb, thus leads to a determination of the hygrometric state of the air.

So far, we have spoken of the instruments now in common use. But the *air-T.* was probably the oldest form; and has a scientific superiority over those above described. Theoretical and experimental investigations, connected with the modern Dynamical Theory of Heat (see FORCE: HEAT), show that equal increments of heat produce almost exactly equal changes of bulk in a nearly perfect gas, such as air, if the pressure to which it is exposed be constant. Hence, temperature, as measured by an air-T., gives a true indication of the quantity of energy present in the form of heat. As the comparison of an air-T. with a mercurial one shows that, for temperatures not greater than 300° C., or 572° F., the indications of the two agree very closely, the ordinary mercurial T. practically possesses within these limits the same advantage.

As the pressure of a gas depends on the amount of heat that it contains, the *absolute zero* of temperature, or the temperature of a body wholly deprived of heat, may be determined by finding the temperature at which a perfect gas would cease to exert pressure. For ordinary temperatures, it is found (see HEAT) that air increases in bulk by ·3665, and hydrogen by ·3668 of its bulk, when heated under constant pressure from 0° to 100° C. Again, by Boyle's law, if the air be compressed again, at constant temperature 100° C., to the bulk it had at 0° C., its pressure is increased by ·3665 of its former amount. Thus, p_0 being the pressure at temperature 0° C., p_t that at t° C., we have, when the volume is kept constant,

$$p_t = p_0(1 + \cdot 003665t).$$

If we assume this to hold for all temperatures, p_t vanishes when

$$1 + \cdot 003665t = 0;$$
$$\text{or } t^\circ = -274^\circ \text{ C. very nearly.}$$

That is to say, at 274° C. under the freezing-point of water, a perfect gas ceases to exert pressure on its containing vessel—i.e., is deprived of that thermal energy on which pressure depends.

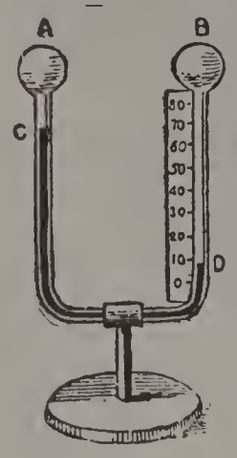


Fig. 2.

The air-thermometers in common use are affected by the pressure, as well as the temperature, of the atmosphere. To avoid this inconvenience, Leslie and Rumford in the 19th c. revived the *Differential T.* of Sturmius. This instrument, in one of its many forms, is represented in fig. 2. Here a bulb is blown at *each* end of the tube (which is bent into a U-form), and the liquid in the stem is used merely as an index, both balls being full of air. The length of the column of fluid is usually adjusted so that it can just fill one of the vertical arms and the horizontal portion of the tube; and the quantities of air in the two balls are so adjusted, that the column will take this position *when the two balls are at the same temperature.* If the ball A be heated more than B, the liquid index will take a new position, such as CD, and this is read off by a scale applied to either of the vertical arms. The graduation of this instrument may be effected by calculation, but it is usually done experimentally. Leslie made good use of it in his investigations on heat; and, with various adjuncts, e.g., coloring the glass of the ball A, while that of B was left white; silvering or gilding one of the balls; covering one of them with moist silk or linen, etc., this instrument became in his hands a *Photometer*, an *Æthrioscope*, a *Hygrometer*, etc.

To thermometers which depend for their action on the expansion of solids, the name PYROMETER (q.v.) is frequently given; but that of Bréguet, as delicate as a good ordinary mercurial T., is not alluded to in that article. The principle of this very beautiful instrument may be explained thus: In bending a slip of wood, the fibres on the convex side are necessarily more extended than those toward the concave side. Conversely, if the fibres on one side of a slip of wood were to expand more than those on the other, the slip would bend. Bréguet solders together two thin strips of gold and platinum, or platinum and silver; for portability and concentration bends the compound strip into a helix, fixes its upper end, and attaches a horizontal index to the lower end. The least change of temperature in the surrounding air changes the length of one side of the compound slip more than the other, and the helix twists or untwists through an angle very nearly proportional to the change of temperature.

For measuring radiant heat, the most delicate instrument is the thermo-multiplier: see ELECTRICITY.

THERMONATRITE, n. *thėr-mō-nā'trīt* [Gr. *thermos,* warm, and Eng. *natron,* crude carbonate of soda]: prismatic carbonate of soda with slight earthy impurities, occurring with natron in the lakes of South America, the Egyptian desert, etc.

THERMOPHONE: a different platinum-resistance thermometer, in which the galvanometer that is most commonly employed is replaced by a telephone. Two coils of platinum wire, which are exposed to the respective temperatures that are to be compared, are introduced into two of the arms of a Wheatstone's bridge whose remaining arms contain known resistances. The telephone is placed in the cross-arm of the bridge. An alternating or pulsating current of low frequency is used in making the observation, and when the bridge is in balance, this fact is indicated by the silence of the telephone. See Warren and Whipple, *The Thermophone,* in *The Technology Quarterly,* Vol. VIII., page 125.

THERMOPILE, n. *thėr'mō-pīl* [Gr. *thermos,* warm, and Eng. *pile*]: a pile of alternate bars of dissimilar metals joined only at the ends, which develops an electric current by the application of heat at one of the points where the metals are joined.

THERMOPYLÆ: in classical geography, a pass on the southeastern frontier of Æniania, Greece, leading from Thessaly into Locris, and on the route of the only good road from Thessaly to central Greece. It was situated between the range of Mount Œta and an inaccessible morass which bordered the Maliac Gulf; and in breadth it was a narrow tract of perhaps some 50 feet. Its name was derived from the presence of thermal springs. As the only means by which a hostile army might penetrate from northern into southern Greece, it held a peculiar strategic value in Grecian history. It is celebrated as the scene of the defense by Leonidas and the 300 Spartans against the vast host of Xerxes in B.C. 480, August. The account of this battle given by Herodotus has been generally followed. Xerxes, ridiculing the members of the Hellenic defenders (5,200, not counting the Locrians, whose numbers are not known), sent against them the Medes and Cissians with instructions to take them prisoners and bring them before him. When, after a day's fighting, these were unsuccessful, the picked 10,000, called the 'Immortals,' were sent forward; but, handicapped by the shortness of their spears, they were no match for the Hellenes, of whom few fell, while the Persian loss was on both days excessive. Xerxes was now in great perplexity, when Ephialtes, a Malian, came 'to tell him of the pathway which led across the mountain to Thermopylæ.' This path ascended the gorge of the river Asopus, and the hill Anopæa; then passed over the crest of Œta and to the rear of Thermopylæ. The Persians arrived in the rear of Thermopylæ soon after

mid-day of the third day. Tidings of their coming had already been brought to the Greeks by scouts and Persian deserters. Most of the Greeks withdrew, but the Spartans and the Thespians (700) remained, and the Thebans (400) were compelled to stay. Of the Spartans and Thespians, all fell; and of the Thebans, few escaped. To the complaint that the Persian arrows darkened the sky the Spartan Dieneces is said to have answered, 'Good; then we shall fight in the shade.'

Through deposits from the Spercheius and other streams, great alterations have taken place at Thermopylæ, so that it is not now a pass, but a swampy plain. Consult Schliemann, '*Untersuchungen der Thermopylen* (1883), and various standard histories of Greece.

THERMOPYLÆ OF AMERICA, a title applied to Fort Alamo, Texas. See ALAMO, THE.

THERMOSCOPE (Greek, 'to show heat'), any instrument for indicating temperature. The term is commonly applied, however, to such instruments as indicate one temperature only, or a very limited number of temperatures; or to those which are used for indicating changes or difference of temperature, without giving the magnitude of these changes or differences. The forms that have been given to instruments of this kind are so manifold as to be almost past enumeration. As a single illustration, the instrument may be cited, whose indications depend upon the melting points of alloys. An instrument or device of this sort contains buttons or wires of a number of alloys, whose several melting points are known; and in the observation of temperature by this method, the instrument is exposed to the temperature under examination, and a note is made of which of the alloys melt, and of which remain unmelted. If T_1 is the melting point of the least fusible of the alloys that have melted, and T_2 is the melting point of the most fusible of the alloys that have not melted, we can then assert that the temperature under consideration is higher than T_1, but lower than T_2. For many purposes in the arts, it is quite sufficient to know, in this manner, that a temperature is between certain limits. A thermoscope which can only indicate certain limits between which a temperature lies, is called a 'discontinuous thermoscope.' Continuous thermoscopes, which are capable of affording an actual measurement of any temperature within their range, are now commonly called 'thermometers,' whether they resemble the ordinary mercury-in-glass thermometer or not. A thermoscope in which temperature is inferred by noting the electrical resistance of a coil of platinum wire, for example, is called a 'platinum resistance thermometer.'

THERMOSTAT, n. *thėr'mō-stăt* [Gr. *thermos*, warm; *statos*, standing]: a self-acting instr. for regulating

temperature. THER'MOSTAT'IC, a. *-stăt'ĭk*, pertaining to a thermostat: heat-regulating.

THERMOTAX'IS: the regulation of the temperature of the body. The principal sources of animal heat are muscular exercise and the combustion of food, involving absorption of oxygen and liberation of carbon dioxide. Body temperature remains about normal under many trying circumstances through the balance maintained by the nervous system between its production and its dissipation. The chief avenues of dissipation are radiation from the surface of the body, the expired air, and the excreta. Febrile action or fever is believed to be due to an over-production of heat, to an underelimination, or to both. The overproduction is believed to result from an increased combustion especially of albuminous substances of the body, with an increased discharge of carbon dioxide and the nitrogenous wastes, urea, creatine, and creatinine. When fever prevails the action of the heart is accelerated, the secretions of glands are impaired, and the intricate process of metabolism is deranged. Heat-regulation, effected by reciprocal changes in heat-production and heat-dissipation and depending essentially upon the influence of cutaneous impulses and the temperature of the blood, is governed, it is generally believed, by two nerve-centres, one controlling heat-production, the other heat-dissipation.

THERMOTICS, n. plu. *thėr-mŏt'ĭks* [Gr. *thermos*, warm]: the science of heat. THERMOT'IC, a. *-ĭk*, or THERMOT'ICAL, a. *-ĭ-kăl*, pertaining to heat; produced by heat.

THERMOT'ROPISM: a tendency toward warmth, exhibited in the reactions of animals. An example is found in the care with which ants move their eggs and larvæ from place to place in order to secure a proper and equable temperature for their welfare. Compare HELIOTROPISM, with which tendency this is somewhat confused.

THERMS, *thėrmz*, or THAIRMS, n. plu. *thārmz*, or THARMS, n. plu. *thârmz* [AS. *thearm*, an intestine, an entrail]: in *Scot.*, the intestines, as of a sheep; guts; prepared guts, as for musical strings; also spelled FEARNS, n. plu. *fėrnz* or *fārnz*.

THE'ROID: having animal propensities or characteristics; specifically applied to idiots, who in habits or appearance resemble any of the lower animals. The word is of recent introduction, but the extraordinary resemblances presented by some of the weak-minded to certain birds and mammals have attracted attention for a very long period.

THEROMOR'PHA, or ANOMODONTIA: an order of extinct (Triassic and Permian) reptiles. 'The dominant group among the earliest reptiles in each quarter of the globe where they have as yet been discovered,' says

Woodward, 'is directly intermediate in skeletal characters between the highest labyrinthodonts (*Mastodonsaurus* and its allies) and the lower mammals (*Monotremata*). Its members first received the name *Anomodontia* in allusion to the varied modifications of the dentition, so unusual among reptiles. They were afterward named *Theromorpha* or *Theromora* . . . in allusion to the many obvious resemblances in their skeleton to that of monotreme mammals.' These similarities are chiefly of the dentition, zygomatic arch, pelvis, crurotarsal joint, scapula and occasional doubling of the occipital condyle. The general shape of the skull is often closely mammalian, but its details show its unquestionable reptilian features. Three suborders are recognized—*Pareiosauria, Theriodontia,* and *Anomodontia.*

The theromorphs were all land-reptiles with short, stout limbs and powerful jaws. Some were massive and of great size, like great alligators with turtle-like or even log-like heads; others small and probably as agile as a weasel. They were the predatory beasts of their age, and were adapted in powers and characteristics to the pursuit of a large variety of animal prey. The most unreptile-like were those of the suborder *Theriodontia.*

It is a natural suggestion that the race of mammals, undoubtedly of reptilian origin, must have descended from this group, whose bones (numerous in the Triassic rocks of the Western United States) show so many mammalian features; but thus far no direct connection can be shown. The dinosaurs, however, seem certainly to have descended from this stock. Consult Woodward, *Vertebrate Palæontology* (London 1898); Gadow, *Amphibia and Reptiles* (New York 1901), wherein many further references to details will be found.

THESAURUS, n. *thē-saw'rŭs* [L. *thēsaurus;* Gr. *thēsauros,* a treasure]: treasury or storehouse; repository of knowledge; lexicon; Dictionary (q.v.).

THESE, a. *thēz* [AS. *thæs*]: the plu. of THIS (q.v.).

THESEUM, *thē-sē'ŭm,* or THESEION, *thē-sē'ŏn:* a temple in ancient Athens dedicated to the commemoration of Theseus and his exploits. It stood on an elevated site northwest of the agora and in early Christian times was used as the church of Saint George of Cappadocia. Within its precincts Cimon deposited the bones of the hero which he had brought from the island of Scyros. The temple was begun 465 B.C. Many consider it to have been originally dedicated to Heracles or Hephæstus, but there is no reason to doubt that it is actually a Theseum. It was constructed of Pentelic marble in the purest Doric style and is technically to be described as an amphiprostyle, hexastyle peripteral temple, with pronaos, and opisthodomos or epinaos. The façade and rear pediment have each six columns; the sides thirteen each; their height being about 30 feet.

THESEUS.

THESEUS, *thē'sūs,* or *thē'sē-ŭs:* one of the most celebrated legendary personages of the Greek heroic age. The legend of his career is differently told, but he is usually said to have been the son of Ægeus, King of Athens, by Æthra, daughter of Pittheus, King of Trœzen. He was brought up at the court of his maternal grandfather, and, reaching manhood, proceeded to his father's residence at Athens. On his way thither he performed several famous exploits, such as the destruction of Periphetes, Sinis, Phæa, the Krommyonian sow, Skiron, Kerkyon, and the fell robber Prokrustes: see PROCRUSTES. After his arrival, Medea sought to poison him, but her plot failed. Ægeus recognized his son, and Medea and the sons of Pallas were banished. The next feats of T. were the capture of the Marathonian bull, and the deliverance of Athens from its dreadful tribute of youths and maidens to the Cretan Minotaur (q.v.), in which he was assisted by the Cretan princess Ariadne (q.v.). On his return to Athens, his father, Ægeus, destroyed himself, and T. succeeded to the throne. In his new capacity of ruler, he showed wisdom equal to his previous heroism. To him the legend ascribes the consolidation of the 12 petty commonwealths of Attica into one state—an event that certainly did occur at some period of Attic history, which was commemorated by the festival of the *Synœkia.* T. also reorganized the Athenaic festival and renamed it the Pan-Athenaic; founded the Isthmian games and many other institutions; but soon the craving for his old stirring life returned, and, having laid down his authority, he went forth with Herakles in quest of new adventures. They fought the Amazons, and T. carried off their queen, Antiope or Hippolyte, by whom he had a son. After the death of Antiope, he married Phædra. The legend, by a ludicrous anachronism, makes him take part in the Argonautic expedition, join in the Calydonian hunt, help Peirithous and the Lapithæ against the Centaurs, and assist in the attempt to rescue Persephone from the lower world (which led to a long imprisonment there, from which he was delivered by Herakles). Returning to Athens, he found that the minds of the people had been prejudiced against him during his absence; and as he could not reestablish his authority, he withdrew to Skyros, where he was treacherously destroyed by King Lykomedes. Cimon is said to have discovered his grave at Skyros, B.C. 469, and to have brought back his bones to Athens. What grain of historical fact may lie in the myth of T. it is impossible to say. One of the most brilliant figures of the heroic age, reminding us, by his valor, wisdom, and generous love of the fair sex, of a knight of chivalry, we are loath to yield him as a victim to the ravenous maw of criticism; yet all that can be said for his historic reality is, that so finished and admirable a prince is more likely to have been a legendary tradition of some real hero of primeval times than a mere creature of the poetic imagination.

THESIS, n. *thē'sĭs,* THESES, n. plu. *thē'sēz* [L. and Gr. *thesis,* a placing or setting, a proposition—from Gr. *tithēmi,* I place, I set: F. *thèse:* It. *tesi*]: position or proposition laid down or advanced to be supported by argument; a theme; a subject or question prescribed to a student on which to write before granting him a degree; the exercise or essay itself; a subject; in *logic,* an affirmation, as distinguished from a hypothesis.

THESIS, n. *thē'sĭs* [Gr. *thesis,* a setting or placing—from *tithēmi,* I set, I place]: in *verse,* originally and correctly the accented, but in modern usage the unaccented part of the foot: see ARSIS.

THESMOPHORIA, *thĕs-mō-fō'rĭ-a* [Gr. plu. of *thesmophoros,* lawgiving]: festival celebrated in different parts of anc. Greece, but especially in Attica, in honor of Demeter, as the *thesmophoros* or 'lawgiving' goddess, inasmuch as, by the introduction of agriculture, she gave the first impulse to civil society, especially to the honorable bond of marriage. The T. lasted three days, from the 11th of the month Pyanepsion (Oct. 24). Only married women could take part in the ceremonies. After certain preliminary purifications (among which abstinence from sexual intercourse was prominent), the women inaugurated the solemnity by marching in procession from Athens to Eleusis, where the night was spent in celebrating the mysteries of the goddess. The next day, called *nesteia,* or the 'day of fasting,' was spent in mourning. The women sat for a while on the ground around the statue of Demeter, and ate nothing but cakes made of sesame and honey. They next proceeded barefooted to the Thesmophorion or temple of Demeter, where they deposited their mystical offerings to the goddess. On the third day, called *Kalligeneia* in honor of Demeter as the 'mother of beautiful offspring,' fasting was exchanged for merriment, jollity, and raillery.

THESMOTHETE, n. *thĕs'mō-thēt* [Gr. *thesmothĕtēs*—from *thĕsmŏs,* that which is laid down, a law; *tithēmi,* I place]: in *anc. Greece,* a lawgiver; a legislator; especially, one of the six junior archons at Athens, who among their other duties revised the laws annually.

THESPIAN, a. *thĕs'pĭ-ăn* [Gr. *Thespis,* the founder of the Greek drama]: of or pertaining to the drama.

THES'PIS: see DRAMA.

THESSALONIANS, *thĕs-sā-lō'nĭ-anz,* EPISTLES TO THE: two epistles addressed by Paul to the Thessalonians, the first being perhaps the earliest of his epistles.

THE FIRST EPISTLE was written probably at Corinth about the close of A.D. 52, and occasioned by the 'good tidings' which Timothy brought him of the 'faith and charity' displayed by his Macedonian converts. It may be divided into two portions, a *narrative* and a *hortatory;* the former comprising the first three chapters, terminating with a prayer for the Thessalonians; the latter the remaining two chapters. The narrative portion gives much important and interesting information regarding the 'Church

of the Thessalonians;' but perhaps its great value consists in the picture that it presents of the apostle himself—'bold in God,' yet 'gentle, even as a nurse cherisheth her children;' scorning to use 'flattering words,' or to 'seek glory' from an assertion of his apostolic dignity; nay, in the excess of a noble pride, 'laboring night and day because he would not be chargeable unto any.' The epistle is conspicuous for absence of the ordinary doctrinal element; even the word 'justification,' it has been remarked, does not occur: on the other hand, it is penetrated with a deep conviction of the nearness of the second coming of Christ, and with an undefined fear lest, in spite of all his labors, the 'tempter' (probably, in this case, the Hellenistic Jews of Thessalonica) should seduce the Thessalonian Christians from the 'faith.' Baur (q.v.) was the first to impugn the genuineness of the epistle; but his opinions on this point have found little favor among scholars.—See Jowett's, Ellicott's, and Meyer's *Commentaries;* and the New Test. Introductions of Bleek, Hilgenfeld, and Scrivener.

The Second Epistle also was written probably at Corinth, a few months after the first. It is generally thought to have been occasioned by the misapprehension of the apostle's meaning on the subject of the coming of Christ to judgment, to which the previous letter had given rise; though Hug and others consider the expression 'be not troubled . . . by letter, *as from us*' (ii. 2), as indicating that somebody had forged an epistle in Paul's name; and it is scarcely possible to interpret the passage at the close of the letter, 'The salutation of Paul with mine own hand, which is the token in every epistle: so I write' (iii. 17), otherwise than as a precaution against forgery. From its contents, we gather that adversaries of the apostle had been at work among his Macedonian converts, and had misrepresented his teaching, particularly on the topic above mentioned. Whoever they were (probably Jews or Judaizing Christians), they must have obtained some success; for we are distinctly aware of a sharper and more imperious tone in the language of Paul. He now teaches more precisely that Christ could not come until the antagonistic forces in human or diabolic society had made themselves more prominent, and done their worst. The genuineness of this epistle has been doubted or denied by some who have no question about the first.

THESSALONI'CA: see Salonica.

THESSALY, *thĕs'a-lĭ:* largest division of anc. Greece; s. of Macedonia and e. of Epirus, separated from the latter by Mt. Pindus, and from the former by the Cambunian Mountains; the Ægean Sea bounding it on the e., and the Maliac Gulf and Mt. Œta on the s. T. proper is a vast plain shut in on every side by mountains; n. and w. by those above named, s. by Mt. Othrys, e. by Mts. Pelion and Ossa, the only opening being the vale of Tempe in the n.e., between Ossa and Olympus. The plain of T. is said at one time to have been a vast lake, whose waters found an outlet by the vale of Tempe. This plain is drained chiefly by the river Peneius (now *Salambria*), which

traverses the country in a n.e. direction, and its tributaries; and is the most fertile in all Greece, producing in ancient times abundance of corn and cattle, and a breed of horses considered the finest in Greece.

History.—T. was called originally Æolia, indicating that the country was at one time inhabited by Æolians, who, however, were either expelled (proceeding s., and taking up their residence in Bœotia, etc.) or reduced to slavery by immigrants from the more rugged region of Epirus about B.C. 1000. As in Laconia, the inhabitants of T. appear to have been divided into three classes—1, the Epirote conquerors, who became rich landed proprietors; 2, those descendants of the original inhabitants who, though dependent on the nobles, yet possessed a few privileges—corresponding to the Laconian Periœci; 3, the Penestæ, or those of the original inhabitants who had been reduced to serfdom, and who cultivated the lands of their conquerors, corresponding to the Helots, though on the whole their condition was better. These last frequently rebelled against their masters, who were very often at war among themselves. Each of the four districts into which T. proper was divided was regulated by a council of its own; but they were occasionally united under a Tagus or president, whose power and time of office appear to have been indefinite. The government, from an early time, appears to have been oligarchical in the separate cities—of which Pharsalus, Larissa, Heracleum, and Pheræ were the chief—the principal power being in the hands of the two great families Aleuads and Scopads, famous for hospitality and encouragement of poets and artists. T., however, never took any important part in Grecian history, and it was only after the end of the Peloponnesian war that it exercised any influence on the affairs of Greece. About B.C. 374, Jason, Tyrant of Pheræ, was elected Tagus of all T. The rule of Jason's successors became so unbearable that aid was sought from Philip of Macedon, who in 344 subjected the country to Macedonia. T. remained subject to the Macedonian kings till the victory of Cynocephalæ B.C. 197 brought it under the protection of Rome. Under the emperors, T. was united with Macedonia, but after Constantine it was a separate province. In A.D. 1204, with other portions of the Eastern Empire, it came under the dominion of the Venetians, and 1355 was taken by the Turks. The restoration to Greece of T. s. of the Salambria was recommended by the Berlin Congress 1878; and subsequently various modifications of the Greco-Turkish frontiers were proposed. War between Greece and Turkey seemed imminent; but 1881 Turkey agreed to cede, and Greece to accept, T. s. of the ridge of mountains forming the water-shed of the Salambria (anc. Peneus). A war between Turkey and Greece (1897) resulted in the recession of a strip of territory on the n.

THETFORD, *thĕt'fĕrd:* municipal borough and market-town of Norfolk, England, on the Little Ouse, 96 m. n.n.e. of London by the Great Eastern railway. Malting is carried on to a considerable extent, and there is some trade on the Ouse, which is navigable to this point. There are remains of a Cluniac priory and of other religious edifices. —Pop. 4,600.

At T., which is a very ancient town, a synod was held 669; and two centuries later, 870, it was taken and sacked by the Danes. In the time of Edward III. the town had 20 churches and 8 monasteries.

THETIS, *thē'tĭs:* daughter of Nereus and Doris, married against her will by the gods to Peleus, by whom she became the mother of Achilles. She dwelt in the depths of the sea with her father, and had, like Proteus, the power of changing her shape. Her hand is said to have been sought by Poseidon and Zeus, who gave up the pursuit on Themis declaring that the son of T. would be greater than his father.

THEURGY, n. *thē'ĕr-jĭ* [Gr. *theourgĭa*, the work of God, a miracle—from *thĕŏs*, a god; *ergon*, work]: a miracle; the power of doing supernatural things by invoking God, etc.; a species of magic. THE'URGIST, n. *-jĭst*, one who pretends to theurgy. THEURGIC, *thē-ĕr'jĭk*, or THEUR'GICAL, a. *-jĭ-kăl*, pertaining to or done by theurgy.

THEW, n. *thū* [AS. *theaw*, custom, behavior]: in *OE.*, manner; custom; quality; habit of life. THEWED, a. *thūd*, in *OE.*, educated; accustomed.

THEWS, n. plu. *thūz* [same as Eng. *thigh*, the fleshy part of the leg: Icel. *thjo*, buttocks: AS. *theoh;* Dut. *dij*, the thigh]: muscles; brawn; strength. THEW, in *OE.*, a thigh; a fat plump part. THEWY, a. *thū'ĭ*, having strong or large muscles; muscular. THEWS AND SINEWS, the pith and strength of any effort or enterprise.

THEY, pron. *thā* [AS. *thâ;* Dan. *de*, they]: the nom. plu. of *he*, *she*, or *it*, denoting more than one person or thing; used indefinitely, as '*they* say'—that is, people generally, or the world at large, say. *Note.—They*, *their*, *them*, may allowably be employed, even though their correlatives be in the sing. number; the use of these forms as singulars tends to prevent awkward repetitions and direct personalities. Such a form of expression as 'neither John nor his sister could say *his* or *her* lessons,' though strictly and grammatically correct, is an awkward one, and sounds harsh: 'neither John nor his sister could say *their* lessons,' is more pleasant to the ear, and is quite in accordance with common usage.

THIAN-SHAN, or TIEN-SHAN, *tē-ân'shân* (Celestial Mountains): great mountain system, consisting of several ridges, mostly parallel, in central Asia, s. and e. of Lake Issyk-kul; lat. about 42° n.; said to extend e.n.e. from the vicinity of Samarkand, to about long. 96° e.—1,500 m. It is one of the four great ranges, trending in a general direction from w. to e., which traverse central Asia—viz.: the Altaï-Sayan, or Altaïan Mts., in lat. about 50° n.; the T.

Mts., lat. about 42° n.; the Kuen-lun system, lat. about 36° n.; and the Himalaya Mountains. In long. 76°—79° e., the Thian Mts. are divided into two great, nearly parallel ridges, and inclose between them a deep valley, about 15 m. in average breadth, through which the river Narin—chief head-water of the Syr-Daria—flows w.s.w. East of these ranges the mountains are known as the Tengri-Tagh, the chief peak being the Tengri-Khan, 24,000 ft. East of the Tengri-Tagh the Thian continues in a double chain, at average height 11,330 ft. The s.w. branches of the Thian (the Alai and Trans-Alai), extending toward the Pamir, contain among others the 'Kaufmann' peak, over 25,000 ft. high. The e. section has the most stupendous glaciers, snow-fields, and snow-peaks. The belief that there were volcanoes in the system was disproved 1881, the fire and smoke seen having been shown to be due to the burning of ignited coal-beds. North of Thian is the Ili or Kuldja valley, s. is the basin of the Tarim.

THIBAULT, *tē-bō*, Jacques Anatole (Anatole France): French novelist and poet: b. Paris 1844, Apr. 16. The son of a librarian, he himself after finishing his studies at the Stanislaus College in 1876, became attached to the library of the Senate. He contributed to leading French journals and after the withdrawal of Jules Claretie from the *Temps* to become administrator of the Comédie Française, he supplied the place of the latter and contributed to that paper a weekly chronicle under the title *La Vie littéraire*. His first publication was a life of Alfred de Vigny (1868); then followed *Poèmes dorés* (1873) and *Noces corinthiennes* (1876), poems afterward collected into one volume with additions in 1897. His earliest attempts at fiction were *Jocaste* and *Le Chat maigre* (1879). His next novel, *Crime de Sylvestre Bonnard* (1881) was crowned by the Académie Française. Other works are *Désirs de Jean Dervieu* (1882); *Livre de mon ami* (1885); *Nos enfants* (1885); *Balthazar* (1889); *Thais* (1890), from which an opera was made by Massenet in 1895; *Opinions de Jérôme Coignard* (1893); *L'Etui de nacre* (1894); *Rotisserie de la reine Pedauque* (1895); *Puits de Sainte-Claire*, containing *Procureur de Judée* and *Jardin d'Epicure* (1895); *Lys rouge* (1896); *L'Orme du Mail* (1897); *Mannequin d'Osier* (1898); *L'Anneau d'Amethyste, Clio* (1899). In his fiction the critical spirit introduced into French literature by Renan finds its development. His analysis of passion is delicate; and passes from a tone of mild irony into one of bitterness. He exhibits various phases of skepticism, and in *Jérôme Coignard* it has been said that no one since Montaigne has been so radical. To him criticism is the highest development of literary expression. 'It proceeds from philosophy and history, and demands for its development an absolute intellectual liberty.'

THIBAUT, *tē-bō,* or THE'OBALD I.: king of Navarre: b. France about 1200; d. 1253. He was educated at the court of Philip Augustus. As the Count of Champagne he is said to have been a lover of the queen of Louis VIII., whose death in 1226 Thibaut was suspected of having caused. He succeeded to the throne of Navarre on the death of his uncle, Sancho the Strong, in 1234. Going in 1239 to Palestine, he suffered defeat at Gaza. He left a reputation in literature as a trouvère whom even Petrarch and Dante, and other great poets praised. His poems, first published in 1742, have appeared in several later editions. Consult Delbarre, *Vie de Thibaut* (1850).

THIBET: See TIBET.

THIBODEAUX, *tēb-ō-dō',* La.: town, parish-seat of Lafourche Parish; on Bayou Lafourche, and on the Southern Pacific railroad, about 50 m. w. by s. of New Orleans and 60 m. s. by e. of Baton Rouge. It is in an agricultural region in which the principal products are rice, sugarcane, and cotton. The industries are connected chiefly with the cultivation and shipment of cotton, rice, sugarcane, and vegetables. There are several private schools, among them Mount Carmel Academy. The state bank has a capital of $25,000. Pop. (1890) 2,078; (1900) 3,253; (1910 est.) 3,500.

THICK, a. *thĭk* [Icel. *thyckr,* close pressed: Dut. *dik;* Dan. *tyk;* Ger. *dick,* thick: comp. Gael. *tiugh,* thick, close set]: not thin; dense; close; compact; muddy; not clear; of relatively great depth from side to side, or from surface to surface; not slender; deep, as five inches *thick;* crowded; following each other in quick succession; without proper intervals of articulation, as a *thick* utterance; dark; misty; obscure; dull; stupid; intimate or familiar, as he is very *thick* with him; as *thick* as thieves: N. the most crowded part, as, the *thick* of the fight: AD. fast; frequently; to a greater depth than usual; closely: V. in *OE.,* to thicken. THICK'LY, ad. *-lĭ,* deeply; closely; in quick succession. THICK'NESS, n. *-nĕs,* closeness or denseness; depth from side to side, or from surface to surface; quantity laid on quantity to some depth; consistence; indistinctness, as of speech; density; grossness; want of quickness of perception. THICK'ISH, a. *-ĭsh,* somewhat thick. THICK-HEADED, a. having a thick skull; hence, dull; stupid. THICKSET, a. closely planted, as a hedge; having a short thick body; thick; large. THICK-SKULL, n. a dull or stupid person; a blockhead. THICK-SKULLED, a. dull; stupid; crass. THICK-STRAKES, in *shipbuilding,* strakes of planking thicker than those in common use. THICK-STUFF, in *shipbuilding,* all planking above four inches in thickness. THICKEN, v. *thĭk'n,* to make or become thick or thicker in any sense; to render less thin; to become more dense; to become dark or obscure; to coagulate; to become more

numerous; to press or be crowded. THICKENING, imp. *thĭk'nĭng:* N. something put into a liquid or mass to make it more thick. THICKENED, pp. *thĭk'nd.* THICK'ET, n. *-ĕt,* a number of growing trees or shrubs crowded irregularly together; a small close wood or copse. THROUGH THICK AND THIN, through whatever is in the way; in spite of every obstacle. THICK-SKIN, a gross coarse man; a numskull.—SYN. of 'thick, a.': dense; gross; coarse; crass; muddy; close; crowded; stupid; dull; deep; frequent; impervious; compact; solid.

THICKHEAD: a South American caterpillar-eating bird of the family *Capitonidæ,* so named because of the full-feathered and apparently excessive size of the head. The family is a large and handsome one, closely allied to the puff-birds, and sometimes united with them under the general term 'barbet.' In other parts of the world 'thickhead' is applied to various other birds (especially in South Africa to the stone-curlew (*Oedicnemus*) of that region, translating the local Dutch name *dikkop.*

THICK'-KNEE: bird of the genus *Oedicnemus,* family *Charadiadæ,* nearly allied to the plovers, though, from its comparatively large size, often ranked with bustards. It differs from the true plovers in having both mandibles inflated toward the tip, and not merely the upper mandible. There are about half a dozen species. One in Britain, the COMMON THICK-KNEE (*O. crepitans*), is known also as the Thick-kneed Plover, Thick-kneed Bustard, Great Plover, Norfolk Plover, and Stone Curlew.

THIEF, n. *thēf,* THIEVES, n. plu. *thēvz* [Goth. *thiuvs;* Icel. *thjofr;* Dan. *tyv;* Dut. *dief;* Ger. *died,* a thief]: one who takes away the property of another secretly and without leave; a secret pilferer; an excrescence or waster in the wick of a candle, causing it to gutter. THIEVE, v. *thēv,* to steal; to play the thief; to pilfer. THIEV'ING, imp.: ADJ. practicing theft. THIEVED, pp. *thēvd.* THIEVERY, n. *thēv'ĕr-ĭ,* the practice of stealing; in *OE.,* that which is stolen. THIEV'ISH, a. *-ĭsh,* given to stealing; addicted to theft; thief-like; acting by stealth; secret. THIEV'ISHLY, ad. *-lĭ.* THIEV'ISHNESS, n. *-nĕs,* the state or quality of being thievish. THIEF-CATCHER, one whose business is to detect thieves and bring them to justice.

THIERRY, *tē-ā-rē',* JACQUES NICOLAS AUGUSTIN: eminent French historian: 1795, May 10—1856, May 22; b. at Blois. He received his education in the normal school of his native town, and became a teacher in a provincial school. In 1814 he resigned this charge, came to Paris, and published his first work, *De la Réorganisation de la Société Européenne.* In this treatise he considers the practicability of having one government for the whole of Europe, preserving at the same time the nationality of each people. Adopting the views of St. Simon, Thierry was for three years his assistant. In 1817 he joined Comte and Dunoyer as editors of the *Censeur Européen,*

in which he wrote many articles, literary, political, and historical. In 1820 he became engaged on the *Courrier Français,* in which he published his *Dix Lettres sur l'Histoire de France.* He now turned almost exclusively to historical writing. Having given up the *Courrier,* he pub. (1825) his masterpiece, *L'Histoire de la Conquête d'Angleterre par les Normands;* and *Lettres sur l'Histoire* (1827)—works which had great success, but whose laborious preparation appears to have ruined the eyesight of the author. Becoming quite blind 1830, he went in that year to Hyères for his health, and there met Julie de Quérengal, authoress of considerable repute, whom he married 1831. He seems to have been able partially to resume work about this time, and 1835 he pub. *Dixs Ans d'Etudes Historiques,* the introduction to which is one of the most eloquent of his works. In 1840 appeared *Récits des Temps Mérovingiens,* which gained the great Gobert prize. The preface gives an eloquent account of his own literary labors. His last publication was *Essai sur l'Histoire de la Formation et de Progrès du Tiers Etat* (1863). Thierry's industry and talents had their deserved reward. His careful research has thrown light on the early ages of which he has written, dispelling much popular error regarding them. He is second to no French historian of the present day.—His younger bro., Amédée Simon Dominique Thierry (1797-1873), also was a historian of high repute, dealing chiefly with Roman Gaul and its period in such works as *Histoire des Gaulois* (1828), *Histoire d'Attila* (1856, frequently reprinted).

THIERS', Louis Adolphe: French historian and statesman: 1797, Apr. 16—1877, Sep. 5; b. Marseilles. His father, a locksmith when Thiers was born, is spoken of also as a cloth-merchant, and as an advocate at the parliament of Marseilles; his mother belonged to an old commercial family which had fallen into poverty. He was placed by his mother's relatives in the Lyceum, where he achieved many victories over his competitors. In 1815 he was sent to Aix to study law. There he formed his friendship with Mignet the historian, with whom, as soon as he had taken his degree as advocate, he set off to Paris to seek his fortune. He lived for a time in obscurity and indigence; but obtaining an introduction to Lafitte, he was enrolled among the contributors to the *Constitutionnel,* then the leading liberal organ. He became distinguished for the vigor and hardihood of his articles; and as in France the occupation of a journalist was then, and for years afterward, esteemed in proportion to its influence over society, the young political writer was admitted into the most brilliant circles of the opposition. In the crowded saloons of Lafitte, Casimir Périer, Comte de Flahault, Baron Louis (great financier of the era), and of Talleyrand, he was favored with an intercourse with actors in the grand revolutionary drama, eminently helpful to him in his great historical under-

taking. *L'Histoire de la Révolution Française* at once placed the briefless advocate and young political writer in the highest ranks of literary celebrity. Three editions were soon called for, and the profits on the sale, with the gift of a share in the *Constitutionnel*, by an admirer, raised him to comparative affluence. Leaving his garret in the alley of Montesquieu, he emerged into prominence among French leaders in the two paramount fields of literature and politics. 1830, Jan., he established a new paper of more democratic principles, the *National*. Assisted by Armand Carrel and some of the ablest of the liberal party, Thiers, in this journal, waged unrelenting war against the Polignac administration, which at length, stung beyond endurance, took the desperate measure of issuing the ordinances of July. The revolution of 1830 was the result. Thiers now entered on a public career, and was appointed secretary-general to the minister of finance, and elected deputy for the town of Aix. His first appearance in the chamber of deputies gave no promise of his subsequent distinction. His diminutive person, his small face, encumbered with a pair of huge spectacles, and his whole exterior presenting something of the ludicrous, the new deputy, full of the impassioned eloquence of the revolutionary orators, attempted to impart the thrilling emotions recorded of Mirabeau. The attempt provoked derision; but soon subsiding into the more conversational mode natural to him—easy, vigorous, rapid, anecdotic—he became one of the most formidable of parliamentary champions; and, in the epigram of debate, ranked second to Lord Beaconsfield only, among statesmen of his time. From 1832, when the Soult cabinet was constructed, he continued till 1836 a minister (of the interior, of commerce and public works, for foreign affairs), with one short interval. 1836, Feb., he was nominated president of the council and foreign minister by Louis Philippe, but held this office only till Aug., when he passed into opposition. In 1840 he was again called by the king to the premiership. He refused Lord Palmerston's invitation to enter into alliance with England, Austria, and Prussia for preservation of the integrity of the Ottoman empire—desiring rather to secure for France a controlling power in Syrian and Egyptian affairs. Lord Palmerston entered into the treaty without France; Acre was taken by the British fleet, and Mehemet Ali was driven out of Syria. The popular irritation in France fostered by Thiers was excessive; and Thiers alarmed the continent by his threats of setting aside the treaties of 1815, and extending the French frontier to the Rhine. It was computed that he spent about $40,000,000 in military and naval demonstrations. The British government found occasion for remonstrance on certain procedures; and Louis Philippe dismissed his bellicose prime minister. He employed his leisure in historical pursuits. His *Histoire du Consulat et de L'Empire*, begun 1845, completed 1860, is one of the greatest historical works of the age.

At the revolution of 1848, he accepted the republic, but was banished after the *coup d'état* (see LOUIS NAPOLEON). After a short residence in Switzerland, he was permitted to return to Paris, where he published a continuation of his *History*. He re-entered the chamber 1863, having been elected deputy for the department of the Seine by the liberal opposition. In his speeches, Thiers constantly taunted the empire with the loss of foreign *prestige;* and these taunts are not to be left out of record when the disastrous war of 1870 is to be rightly accounted for. When that conflict became inevitable, he predicted the certain defeat of France in it. The early disasters of the war brought him into special prominence. It was Thiers who suggested laying waste the country around Paris. He declined to become a member of the government of national defense formed at the downfall of the empire; but voluntarily undertook diplomatic journeys to England, Russia, Austria, and Italy, on behalf of France—which were unsuccessful, but which gained for him the gratitude of his countrymen. According to the suggestions of these four neutral powers, Thiers opened negotiations—unavailing at the time—for peace with the king of Prussia at Versailles. After the capitulation of Paris, Thiers was elected to the national assembly, which chose him head of the provisional government. It was due to his good sense that the French accepted the offered terms of peace. In 1871, after having crushed the Commune and restored order, he ceased to be 'chief of the executive power' of France, to become 'president of the French republic'; and this office he held till 1873, May, when, failing in his effort to make the republic permanent by definitive legislation, he gave place to Marshal MacMahon. His death was a severe blow to the republicans of France, whose leaders had latterly come to regard Thiers, though a 'conservative republican,' as head of the whole republican party. Thiers had been a member of the *Académie Française* since 1836.

THIGH, n. *thī* [AS. *theoh;* Dut. *dij,* thigh: Icel. *thjo,* thick part of the thigh]: the thick part of the leg between the knee and the hip-joint. THIGH-BONE, the large bone of the thigh.

THILL, n. *thĭl* [AS. *thil,* a stake: Icel. *thil,* a panelling]: the shaft of a cart, carriage, or other vehicle. THIL'LER, n. *-lėr,* or THILL-HORSE, the horse which goes between the shafts.

THIMBLE, n. *thĭm'bl* [AS. *thymel,* a thumb-stall—from *thuma,* a thumb (see THUMB)]: a metal cap or cover or ring, with a pitted surface, used on the finger (originally the thumb) in driving the needle through the cloth in the operation of sewing; among *seamen,* an iron ring with a groove around it to receive a rope; among *mechanics,* a sleeve, bushing, or ferrule used to join the ends of pipes, shafting, etc., or to fill an opening, etc.

THIM'BLEFUL, n. *-fûl.* THIM'BLEFULS, n. plu. as much as a thimble can contain; a very small quantity. THIMBLE-CASE, a case for a thimble. THIMBLE RIG, or -RIGGING, a sleight-of-hand trick in which a pea or small ball being concealed or pretended to be concealed under one of three thimbles, the operator offers to bet that no one can tell under which thimble the pea is. THIMBLE-RIG, v. to practice thimble-rigging. THIMBLE-RIGGER, one who practices the above sleight-of-hand roguery to obtain money from the unwary by betting.—*Thimbles* were in use in antiquity in many lands: they are said to have been found at Herculaneum. John Lofting, mechanic from Holland, brought to England the art of making them; and manufactured them near London about 1695.

THIMBLE-EYE: a fish, the chub-mackerel.

THIMBLE RIG, or SHELL-GAME: a sleight-of-hand or gambling trick, performed by means of three thimbles and a pea or three nutshells and a small wooden tube or box. The pea being placed on a table and covered with one of the thimbles, the performer proceeds to shift the thimbles, covering the pea now with one, now with another, and offers to bet any bystander that no one can tell under which thimble the pea is. The person betting is seldom allowed to win, the pea being abstracted by sleight-of-hand. In the United States the trick is commonly known as the shell-game, and is frequently played at race-track meetings, rural fairs, and other gatherings.

THIN, a. *thĭn* [Icel. *thunner;* Dut. *dun;* Dan. *tynd;* Sw. *tunn;* Ger. *dünn;* L. *tenŭis,* thin: comp. W. *teneu;* Gael. *tana,* thin]: not thick; watery; very liquid; not dense; not close or crowded; extended; sparse; lean; slender; slim; fine; of a loose or slight texture; slight; unsubstantial; faint: AD. thinly, as *thin-soled:* V. to make less dense or thick; to make less close or crowded; to reduce the number of; to rarefy. THIN'NING, imp.: N. the act of making less crowded or less thick. THINNED, pp. *thĭnd.* THIN'NISH, a. *-nĭsh,* somewhat thin. THIN'LY, ad. *-lĭ.* THIN'NESS, n. *-nĕs,* the opposite of thickness; slenderness; leanness; paucity; scarcity; rareness. THIN-SKINNED, a. having a thin skin—hence, unduly sensitive. TO THIN OUT, in *geol.,* said of a stratum which gradually diminishes in thickness and disappears.

THINE, pron. *thīn* [AS. *thin;* Goth. *theins;* Icel. *thinn,* thine]: the poss. case of the pron. *thou;* of or belonging to thee.

THING, n. *thĭng* [Icel. and AS. *thing;* Ger. *ding,* originally meaning discourse—then, solemn discussion—cause, matter, or subject of discourse]: that which is or can be thought of; a matter; an affair; an event or action; any substance; sometimes used in contempt, tenderness, or pity, as, 'a hateful old *thing*' (applied to a person), 'the poor *thing* sighed.' THINGS, n. plu. clothes; luggage, as to take off one's *things;* to get one's *things* together.

NOT THE THING, *familiarly,* not as it should be; not right or proper.

THING, n. *thĭng* [Icel. *thing,* a meeting of the people about public affairs: Sw. and Dan. *ting,* an assize of justice]: among the *Scandinavian nations,* an assembly or conference for talk and discussion about public affairs; an anc. parliament or popular court of justice. *Note.*—THING 1 is merely a secondary and popular application of THING 2. (1) The primary meaning is language or talk; (2) the place or assembly where public talk or palaver was held on the affairs of the district or nation; (3) generally any affair or matter for discussion; (4) then finally extended to property, exclusive interests, persons, and objects indefinitely. We have still *folkething,* the lower house of the Danish parliament, and *landsthing,* the upper house; *storthing,* the Norwegian parliament; Sw. *tingshus,* the house for a court of justice; Dan. *tingsted,* a place of justice. Eng. *hustings,* originally in the sing. *husting,* is the same word—till within the last few years common enough, but now almost obsolete.

THING-IN-ITSELF: a term used in the Kantian philosophy to designate the supposed reality behind the world of phenomena which we perceive with our senses. We never can experience things-in-themselves. They remain postulates open to belief, but not demonstrable to sense.

THINK, v. *thĭngk* [Goth. *thagkjan;* Dan. *tænke;* Sw. *tänka;* Ger. *denken,* to think: Icel. *thekkja,* to observe (see THANK)]: to have the mind occupied on some subject; to revolve ideas in the mind; to muse; to hold as a settled opinion; to judge; to consider probable; to meditate; to ponder; to imagine; to intend; to believe; to suppose; to hope; to purpose; to design. THINK'ING, imp.: ADJ. having the faculty of thought; capable of a regular train of ideas: N. imagination; cogitation; judgment. THOUGHT, pt. pp. *thawt.* THOUGHT, n. See THOUGHT. THINKABLE, a. *thĭngk'ă-bl,* capable of being thought of or conceived; conceivable, as a thought. THINK'ER, n. *-ẽr,* one who thinks. THINK'INGLY, ad. *-ĭng-lĭ.* METHINKS or -THINKETH, it seems to me. METHOUGHT, it appeared to me. TO THINK MUCH OF, to hold in esteem; to esteem. TO THINK NOTHING OF, to set no value upon; to have in no esteem; to deem easy of accomplishment. THINK SCORN, in *OE.,* to disdain.—SYN. of 'think': to cogitate; judge; conclude; determine; intend; imagine; conceive; fancy; muse; meditate; recollect; observe; consider; doubt; deliberate; estimate; believe; esteem; expect; guess; reflect; ponder; contemplate; suppose.

THIONVILLE, *tē-ôn-vēl,* or DIEDENHOFEN, *dē'dĕn-hō-fĕn:* Germany, in Alsace-Lorraine, an important railway centre, 18 m. n. of Metz. It stands in a level plain on the Moselle river, and is strongly fortified. Its manufactures comprise gloves, thread and nets; and there are sawmills and tanneries. There is some trade in corn,

hemp, and flax. An important fair is held annually. In the Franco-German war Thionville was invested after the battle of Gravelotte, and after the fall of Metz it was besieged with vigor. In 1870, Nov. 25, it was occupied by the Germans. It suffered severely by the siege. Pop. (1900) 10,060.

THIRD, a. *thėrd* [AS. *thridda;* Icel. *thridi;* Ger. *dritte;* Goth. *thridja;* Gr. *tritos;* L. *tertĭus,* third]: the ordinal of three; next after the second: N. one part of three: the $\frac{1}{60}$ part of a second: in *music,* name given to two different musical intervals, the major *third* being the interval between a note and its mediant, as between C and E, and comprising four semitones, while the minor *third* comprises but three semitones, as from A to C. THIRD'LY, ad. *-lĭ,* in the third place. THIRD-BOROUGH, in *OE.,* an under-constable. THIRD ESTATE, the commons—the lords spiritual and temporal being the other two: in *F. hist.,* the *Tiers Etat* (q.v.). THIRD-RATE, a. inferior.

THIRD ORDER. See FRANCISCANS; TERTIARY.

THIRD-RAIL SYSTEM: in electric railway construction, a method of supplying trains on an electric railway with current sent through a third rail. In starting a train of five cars by electricity from 500 to 1,200 amperes are required. If such currents were passed through a trolley wheel, very excessive arcing would be caused, due to the fact that the wheel touches the wire at only one point. The contact surface is not sufficient to carry this current, and burning of the wheel and trolley wire result. With a sliding shoe, however, instead of a single point of contact, you have a surface about six inches long by two inches wide, and two of these in use at once under normal conditions. In other words, the third-rail system differs from the ordinary trolley road only in detail. These details, however, are such as to make possible the application of electric traction to heavier trains than has been found practicable with the overhead trolley, and the system has thus broadened the field for the application of electricity to railway work, so as to bring it into successful competition with steam for the heaviest classes of service.

THIRDS, n. plu. *thėrdz:* a part of wheat when made into flour. See under WHEAT.

THIRDS, in Law: term denoting the portion of an estate of a deceased husband in which the widow has a life-interest. See DOWER.

THIRL, v. *thėrl* [AS. *thyrel,* a hole: Ger. *thür,* a door: Bav. *tür* and *tirl,* a door, a hole: Icel. *thirla,* to pierce: Goth. *thairh,* through]: in *Scot.* and *OE.,* to pierce a hole through; to perforate; to wound; to cause to vibrate or tingle; to thrill. THIRL'ING, imp. THIRLED, pp. *thėrld.*

THIRL, v. *thėrl* [OHG. *drigil;* Icel. *thræll,* a slave]: to bind or restrict in some way, particularly as to where

one's corn ought to be ground; to enslave; to enthrall. THIRL'ING, imp. THIRLED, pp. *thėrld.* THIRLAGE, n. *thėrl'āj,* in *Scots law,* a kind of servitude by which tenants or proprietors of land were compelled to get their grain ground at a particular mill. Thirlage is extinguished by the ruin of the mill, or by exemption from this restriction for 40 years: see MULTURE.

THIRLING, n. *thėrl'ĭng:* in *min.,* a worked space connecting the rooms of a mine.

THIRLMERE, *thėrl'mēr,* England: a long and narrow lake in the mountains of Cumberland co., in the centre of the lake district, n.w. of Mount Helvellyn, between Derwentwater and Grasmere. It is three miles long by a quarter of a mile wide. The city of Manchester bought and converted it into a reservoir for its water supply, and the system, begun in 1886, was completed in 1894 at enormous expense.

THIRLWALL, *thėrl'wal,* CONNOP, D.D.: English bishop and historian: 1797, Feb. 11—1875, July 27; b. Stepney, England. He was educated at Cambridge, receiving his bachelor's degree 1818, with fellowship and chancellor's medal, and was tutor. After studying law and three years' practice, he turned to the priesthood, was ordained 1828, and became rector of Kirby-under-Dale. Yorkshire. He had translated Schleiermacher's critical work on St. Luke's gospel, and now, with Archdeacon Hare, put forth 2 vols. of *Niebuhr's History of Rome* (1828). This aroused much interest in itself, also in view of the sweeping nature of the method of historical criticism introduced to English readers. His *History of Greece* (1835-47) ranks with Grote's later production as masterly. In 1840 he was raised to the see of St. David's, resigning 1874 on account of infirmity. He made a remarkable speech in the house of lords on the Irish church; and had part in the Old Test. revision. He was buried in Westminster Abbey.—His *Literary and Theol. Remains* and *Letters to a Friend* have been published.

THIRST, n. *thėrst* [Goth. *thaursus,* dry: Icel. *thurr;* Ger. *dürr,* dry: Dan. and Sw. *törst;* Icel. *thorsti,* thirst: Ger. *durst,* thirst: Gr. *tersomai,* I dry up]: a feeling of dryness in the mouth or throat, and desire for water or some liquid to quench it; a painful sense caused by the want of drink; eager desire after a thing wanted; vehement eagerness; V. to feel the want of a liquid, as water; to suffer from the want of drink; to have vehement desire for a thing. THIRST'ING, imp. THIRST'ED, pp. THIRST'Y, a. *-ĭ,* suffering from thirst; very dry; parched; having any vehement desire. THIRST'INESS, n. *-nĕs,* state of being thirsty; vehement desire for a thing; THIRST'ILY, ad. *-lĭ.* THIRST'ER, n. *-ėr,* one who thirsts.

THIRST: The sensation of thirst is produced by a peculiar state of the mucous membrane of the digestive

canal, especially of the mucous membrane and the fauces, caused usually by a deficiency in the system of fluid, either through excessive loss or in consequence of insufficient intake. The sensation of thirst may also be induced by use of salted or highly seasoned food. In cases of extreme thirst there is a peculiar sense of clamminess in the mouth and pharynx; which, with the other disagreeable feelings, is almost immediately relieved by the introduction of liquid into the stomach, where it is absorbed by the veins. That the thirst is relieved by absorption of the fluid, and not by its action as it passes over the mucous membrane, which seems to suffer most, is proved by the facts—(1) that injection of liquids into the stomach through a tube (in cases of wounded œsophagus), and (2) the injection of thin fluids, e.g., water, into the blood, removed the sensation of thirst. An excessive thirst is often an important morbid symptom. It may arise from two very opposite conditions—one a condition of excitement, the other of depression. Whenever the blood is in a state requiring dilution, and is too stimulating, as in fevers and inflammations, there is thirst; and, again, in cases of excessive secretion and exhaustion, e.g., in cholera and in diabetes.

THIRTEEN, n. *thėr'tēn* [*three,* and *ten:* Dut. *dertien;* Dan. *tretten;* AS. *threotyne,* thirteen]: ten and three; one more than twelve. THIR'TEENTH, a. *-tēnth,* the ordinal of thirteen; next after the twelfth: N. one of 13 equal parts.

THIRTEEN AMERICAN COLONIES, THE. See CONFEDERATION OF THE THIRTEEN AMERICAN COLONIES; also, CONSTITUTION OF THE UNITED STATES; UNITED STATES (*History*).

THIRTY, a. *thėr'tĭ* [AS. *thrittig;* Dan. *tredive;* Dut. *dertig;* Icel. *thrjátíu*]: three times ten; one more than twenty-nine: N. the sum of three times ten. THIR'TIETH, a. *-ĕth,* the ordinal of thirty; N. one of 30 equal parts. THIRTY-NINE ARTICLES: see ARTICLES, THE THIRTY-NINE. THIRTY-TWO-MO, contracted into 32mo: see PAPER. THIRTY TYRANTS, (*a*) in *Greek history,* a body of 30 rulers at Athens, invested with sovereign power by the Spartan conquerors at the close of the Peloponnesian war. Their government, which was a veritable reign of terror, lasted only one year, B.C. 404-5. (*b.*) THIRTY TYRANTS of the Roman empire, a set of military usurpers who sprang up in different parts of the empire during the 15 years (253-268) of the reign of Valerian and Gallienus, Cyrades, Macrianus, Balista, Odenathus, and Zenobia, *in the East;* Postumus, Lollianus, Victorinus and his mother Victoria, Marius, and Tetricus, *in the West;* Ingenuus, Regillianus, and Aureolus, in Illyricum and the countries about the Danube; Saturninus, in Pontus; Trebellianus, in Isauria; Piso, in Thessaly; Valens, in Achaia; Æmilianus, in Egypt; and Celsus, in Africa.

THIRTY YEARS' WAR: properly an uninterrupted succession of wars (1618–48) in Germany, in which Austria, the most of the Rom. Cath. princes of Germany, and Spain, were engaged on one side throughout, but against different antagonists. This long strife had its origin in the quarrels between the Rom. Catholics and the Protestants of Germany, and the attempts of the former, who were the more powerful body, to deprive the latter of whatever liberty of worship they had obtained. The severe measures taken by the emperor, the head of the Rom. Cath party, against the Prot. religion, led also to strictures on their civil rights; and it was to protect their political as well as their religious liberties that the Protestants formed a union, 1608, May 4, with Frederick IV., Elector Palatine, at its head. The rival union of the Rom. Cath. powers, under the leadership of the Duke of Bavaria, followed 1609, July 11. In Bohemia, the great preponderance in numbers (two out of three) and influence of the Protestants had forced from their Austrian king an edict of toleration (1609, July 11), which was at first faithfully observed; but during the reign of Matthias, sundry violations of it were made with impunity; and as the influence of Ferdinand of Styria (see FERDINAND II.), his successor, began to be felt in more flagrant partiality to the Rom. Catholics, the kingdom became a scene of excitement; three of the Rom. Cath. party were thrown from the window of the Bohemian council-chamber at Prague, and ultimately Ferdinand was deposed, and Frederick V., Elector Palatine, chosen in his stead (1619); and Count Thurn, at the head of an insurgent army, repeatedly routed the imperial troops, and actually besieged the emperor in Vienna. The Rom. Cath. princes, though as apprehensive as their opponents of the encroaching policy of Austria, crowded to the emperor's aid; and while the Prot. union and James I. of Great Britain held aloof from Frederick, whose sole allies were Bohemians (under Thurn), Moravians, Hungarians, and a Piedmontese contingent of 3,000 (under Count Mansfeld), a well-appointed army of 30,000, under Duke Maximilian, advanced to support the Austrians, and totally routed Frederick's motley array at Weissenberg, 1620, Nov. 8, near Prague, afterward reducing the Upper Palatinate, while an army of Spaniards under Spinola ravaged the Lower Palatinate, and the Saxons (in alliance with the emperor) occupied Lusatia. The Bohemians were now subjected to frightful tyranny and persecution; a similar policy, though more moderate, was adopted toward the people of the Palatinate—the Prot. union standing aloof, and subsequently dissolving, through sheer terror. But the indomitable pertinacity and excellent leadership of Count Mansfeld and Christian of Brunswick, two famous partisan leaders who ravaged the territories of the Rom. Cath. league, and the forced cession to Bethlem Gabor of large portions of Hungary and Transylvania, did much to equalize the success of the antagonistic parties.

Here the war might have ended; but the fearful tyranny of Ferdinand over all the Protestants in his dominions

(Hungary excepted) drove them to despair, and the war advanced to its second phase. Christian IV. of Denmark, smarting under injuries inflicted on him by the emperor, and aided by a British subsidy, came to the aid of his German co-religionists 1624; and, being joined by Mansfeld and Christian of Brunswick, advanced into Lower Saxony, while the emperor, hampered by the political jealousy of the Rom. Cath. league, was unable to oppose him. But when, by the aid of Wallenstein (q.v.), a powerful and effective army had been obtained, and the leaguers under Tilly (q.v.), in co-operation with it, had marched northward, the rout of the Danes by Tilly at Lutter (1626, Aug. 17), and of Mansfeld by Wallenstein at Dessau (1626, Apr 1, 11, and 25), again prostrated the Protestants' hopes; yet a gleam of comfort was obtained from the victorious raid of Mansfeld through Silesia, Moravia, and Hungary; though his scheme for an insurrection in Hungary failed, and his death soon afterward, at Zara, freed the emperor from a formidable and irreconcilable enemy. The combined imperialists and leaguers meantime had overrun n. Germany and continental Denmark, and ultimately compelled King Christian to conclude the humiliating peace of Lübeck (1629, May 12). This second great success seems to have turned Ferdinand's head; for, not content with a still more rigorous treatment of the Protestants, and the promulgation of the *Restitution Edict*, which seriously offended even the Rom. Catholics, he stirred up Poland against Sweden, and insulted Gustavus Adolphus, both personally and in the persons of his ambassadors—insolent impertinences which he soon saw bitter reasons to regret. The Rom. Cath. league now forced him to reduce his army, and supplant Wallenstein by Tilly; while France was inciting Gustavus to the willing task of aiding the Protestants in Germany.

The war entered its third phase by the landing of the Swedes at Usedom 1630, June, and their conquest of Pomerania and Mecklenburg. Gustavus, by a little wholesome pressure, induced the Elector of Brandenburg to aid him; and though unable to save Magdeburg (q.v.), he marched to join the Saxons; completely routed Tilly at Breitenfeld 1631, Sep. 17; victoriously traversed the Main and Rhine valleys; again routed Tilly on the Lech (1632, Apr. 5), and entered Munich. By the judicious strategy of Wallenstein he was, however, compelled to return to Saxony, where he gained the great victory of Lützen (q.v.); but his death, depriving the Protestants of the only man who could force the confederate powers to preserve unity of action, was a severe blow to their cause; though the genius and indefatigable zeal of his chancellor, Oxenstierna (q.v.), and the brilliant talents of the Swedish generals, preserved the advantages that they had gained, till the crushing defeat of Bernard of Weimar at Nordlingen (1634, Sep. 6) restored to the emperor a preponderating influence in Germany. Saxony now made peace at Prague (1635, May 30), obtaining such satisfactory terms for the Lutherans that the treaty was within three months adhered to by all the Ger-

man prínces of that sect, and the Calvinists were left to their fate.

Final success on the part of Austria now appeared to demand only one more strenuous effort; but Oxenstierna, resolved to preserve to Sweden her German acquisitions, propitiated Richelieu (q.v.), by resigning to him the direction of the war; and the conflict advanced into its final and most extended phase. The emperor, allied for offense and defense with the Lutherans, was now assailed also through his ally Spain, which was attacked on her own frontier, in the Netherlands, and in Italy; Bernard of Weimar fighting independently, with the view of obtaining Alsace for himself, opposed the leaguers; while the Swedes, under Baner, held n. Germany, and by frequent flying marches into Silesia and Bohemia, distracted their opponents, and prevented them, after their successes over Duke Bernard, from proceeding with the invasion of France. The great victory of Baner over the Austrians and Saxons at Wittstock (1636, Oct. 4) restored to Sweden the victor's wreath that she had lost two years before; and from this time, especially under Torstensohn (q.v.) and Königsmark, the Swedes were always successful, adding a second victory of Breitenfeld (1642, Nov. 2), one at Yankowitz (1645, Feb. 14), and many of less note, to their already long list of successes, carrying devastation and ruin into the hereditary territories, even to the gates of Vienna, defeating the best generals of the empire, till, from a profound feeling of inability to check them, the Austrians hardly dared appear n. of the Danube. On the Rhine, the leaguers at first had great success—the Weimar troops, now in French pay, were almost exterminated at Duttlingen (1643, Nov. 24); but after the Spanish power had been thoroughly broken in the Netherlands by Condé, the French were reinforced on the Rhine, and under Condé and Turenne (q.v.) rolled back the leaguers through the Palatinate and Bavaria, and revenged at Nordlingen (1645, Aug. 3) the former defeat of the Swedes. The emperor was now deserted by all his allies except the Duke of Bavaria, whose territories were already mostly in the hands of Turenne and Wrangel; and a combined invasion of Austria from the w. and n. was on the point of being executed, when, after seven years of diplomatic shuffling, with an eye to the changing fortunes of the contest, the peace of Westphalia (q.v.) put an end to this terrible struggle.

THIS, a. *thĭs*, plu. THESE, *thēz* [AS. *thes;* Dut. *deze*, Ger. *dieser;* Icel. *thessi*, this]: that is present or nearest in *time* or *place;* that is just mentioned. BY THIS, after such an interval; by this time. *Note.*—THIS is sometimes opposed to THAT, as 'this and that:' when speaking of things mentioned before, *this* refers to the second and *that* to the first—but *former* and *latter* are now commonly used instead of *that* and *this.*

THISBE, n. *thĭz'bē* [L.]: Babylonian maiden described by Ovid as committing suicide because she believed her lover, Pyramus, to be dead.

THISTLE, n. *thĭs'l* [Icel. *thistill;* Sw. *tistel;* Ger. *distel*, a thistle]: prickly plant of the genus *Cardŭus*, ord. *Compositæ*, sub-ord. *Cynarocceph'ălæ*—the large plant usually called the Scotch thistle is *Onopor'don acan'thĭum* (see below): the national emblem of Scotland. THISTLY, a. *thĭs'lĭ*, overgrown or abounding with thistles; prickly. THISTLE-DOWN, n. the fine feathery down attached to the seeds of thistles. THISTLE-FINCH, n. *-fĭnsh*, the goldfinch.

THIS'TLE: plant of several genera of the nat. order *Compositæ*, with spinous leaves, imbricated involucres, and heads of flowers. The flowers are sometimes large, generally purple, rarely white or yellowish. Recent botanists have made two genera—the true T. (*Carduus*), in which the pappus is composed of simple hairs, and the Plume T. (*Cirsium*, including the former *Cnicus*), in which the pappus is feathery.—The species of both genera are numerous, and are found in most of the temperate and cold parts of the n. hemisphere, annual, biennial, and perennial herbaceous plants of considerable size.—The MILK T. (*Silybum Marianum*), biennial native of the old world, attains a height of 4–6 ft., and is remarkable for the milky veins of its large waved leaves. The young leaves are sometimes used as a spring salad. Blanched leaves are used in winter salads. They are used also as a boiled vegetable, with the young stalks, after these have been peeled and soaked in water to extract part of their bitterness. The root is used as Salsify (q.v.). The creeping Plume T. (*Cnicus arvensis*), known in the United States as the CANADA T., is from Europe. It is 1–3 ft. high, with creeping roots, pinnatifid leaves and numerous small heads of flowers, and is a very troublesome weed. The COMMON T. (*Cirsium lanceolatum*) is well known by its large purple heads, of which all the scales have spreading sharp tips; the leaves run down the stem in prickly wings; it also is an introduced species. *Cirsium oleraceum* is a native of n. Europe, distinguished by its yellowish flowers, which are surrounded with large yellowish involucral bracts; the young leaves are used as a culinary esculent. The similar YELLOW T. of the Atlantic coast (sometimes purplish) is *Cirsium horridulum*. The BLESSED T. (*Carduus benedictus* of the pharmacopœias, *Cnicus benedictus* of modern botanists) is a native of the Levant and of Persia, resembling in appearance a *Centaurea*, with yellow flowers enveloped in leaves, and abounding in a gossamer-like down. The whole plant has a very bitter and disagreeable taste; and, besides a bitter extractive, contains much sulphate and muriate of potash and sulphate of lime. It is a powerful laxative-tonic medicine, and a strong decoction of it readily induces vomiting. The COTTON T. (*Onopordon*) is a distinct genus, known by its receptacles being destitute of bristles, and coarsely and deeply honey-combed. The common Cotton T. (*O. acanthium*), native of Europe, but rarely wild in Scotland, is, nevertheless, generally called by gardeners and others the SCOTCH THISTLE. The national emblem of Scotland is not, probably any particular species of T., as botanically distinguished; though the stemless T.

(*Cnicus acaulis*, or *Cirsium acaule*) is in many districts of Scotland so designated. According to the common tradition, the Danes (or Norsemen?) came upon the Scots unperceived in the dead of night; and, halting while their spies were trying to discover the undefended points of their opponents' camp, one of the spies chanced to tread upon a T. of this species, and the loud imprecation which the sudden pain evoked aroused the unsuspecting Scots, who at once attacked the invaders, gained a complete victory, and dubbed the plant which had been the means of their success, the Scotch Thistle. The Cotton T. has large elliptic leaves, and a broadly-winged stem. The young fleshy root and the stem, while still tender, are in many places boiled and eaten. The expressed juice of the plant was formerly reckoned good for cancerous sores and cutaneous eruptions.—Wild species in the United States are the Pasture T. (*Cirsium pumilum*) with single, very large, fragrant, purple heads, rarely white; the Swamp T. (*C. muticum*), 3–8 ft. high, flower-heads purple and rather large, and mostly unarmed, like the leaves; the Tall T. (*C. altissimum*), 3–10 ft., from Penn. s.; the Virginia T. s. and w., with long naked peduncle at top; and the Two-colored T., 3–6 ft., with leaves green above and white beneath.—Plants of the genus *Echinops*, which belongs to a very different section of the *Compositæ*, are often seen in flower-gardens, where they are known as Thistles. The name is also, generally with some addition, bestowed on many plants which have a spinous character. *Centaurea Calcitrapa* is commonly known as the Star T. (see Centaurea).—The Carline T. (*Carlina vulgaris*) is common in dry hilly pastures in parts of Britain.

THISTLE, Order of the; called also the Order of St. Andrew: a Scottish order of knighthood, instituted 1687 by James VII. (II. of England). The earliest known mention of the thistle as the national badge of Scotland is in the inventory of the effects of James III., who probably adopted it as an appropriate illustration of the royal motto, *In defense*. Thistles occur on the coins of James IV., Mary, James V., and James VI.; and on those of James VI. they are for the first time accompanied by the motto, *Nemo me impune lacesset*. On the institution (inaccurately called the revival) of the Order of the Thistle by James, statutes were issued, and eight knights nominated; but the patent for the institution never passed the great seal. After falling entirely into abeyance during the reign of William and Mary, the order was revived by Queen Anne 1703, Dec. 31.

THISTLEWOOD CONSPIRACY: conspiracy formed 1820 by Arthur Thistlewood, with other profligate adventurers, to overturn the government of Great Britain and assassinate the ministers of the crown. The opportunity was to be taken of the funeral of George III.—when all the military would have left London for Windsor—to take possession of London and plunder the shops. The ministers were to be massacred when assembled at a cabinet dinner, and the cannon in Gray's Inn Lane and the Artillery

Ground were at the same time to be seized. A provisional government was to be established, and means taken to intercept communication with Windsor and Woolwich, and prevent any one from leaving England by sea. The conspirators were surprised, and most of them apprehended by the police, Feb. 23, the day appointed for the massacre of the ministers. A few turned king's evidence against the rest; and Thistlewood and four others suffered death for treason.

THITHER, ad. *thĭth'ẽr* [AS. *thider*, thither]: to that place; opposed to *hither;* to that end or point. THITH'ERWARD, ad. *-wẽrd*, or THITH'ERWARDS, *-wẽrdz*, toward that place. TO RUN HITHER AND THITHER, to run this way and that, as if perplexed.

THI'VÆ: see THEBES, in Bœotia.

THLINKETS, *thlĭnk'ĕts:* aboriginal race of Alaska, occupying the coast from Mt. St. Elias to the Simpson river and Sitka, and the neighboring islands. Their name is formed from the word *t'linket* in their own tongue, which means *man*. Their language has no relation to the languages of the other races in contact with the Thlinkets.

THO, ad. *thō* [AS. *thonne*, then]: in *prov.* and *Old Eng.*, then.

THO', *thō:* an abbreviation of THOUGH.

THOLE, v. *thōl* [AS. *tholian;* Icel. *thola*, to suffer, to bear]: in *OE.* and *Scot.*, to bear; to endure; to put up with; to undergo. THO'LING, imp. THOLED, pp. *thōld*.

THOLE, n. *thōl* [Gr. *tholos*, a dome]: in *anc. arch.*, a round building with a conical roof; in *arch.*, the scutcheon or knot in the midst of a timber-vault.

THOLE, or THOWEL, or THOWL, n. *thōl* [AS. *thol*, a thole: Icel. *thollr*, a fir-tree, a pine: Dut. *dol*, an oar-pin: Norw. *toll*, a thole]: a pin inserted into the gunwale of a boat to keep the oars in place when rowing—if there be two to each rowlock, the oar is worked between them—if but one, the oar is kept in place by a thong or lanyard, or by a band or socket.

THOLEN, *tō'lẽn:* island in the Netherlands, province of Zeeland, bounded s. by the Easter Scheldt; containing about 34,000 acres of rich land, and defended from floods by strong dikes whose borders are planted with trees. Wheat, rye, barley, oats, beans, and potatoes are extensively grown. The annual produce of madder reaches a million lbs., and of flax 400,000 lbs. Horses, cattle, sheep, and swine are kept in large numbers. Tholen, chief town (pop. 2,540), is in the s.e. corner of the island.—Pop. of island, about 14,000.

THOLOBATE, n. *thŏl'ŏ-bāt* [Gr. *tholos*, an arched roof; *basis*, a basis]: in *arch.*, that part of a building on which a cupola is placed.

THOLUCK.

THOLUCK, *tō'lûk*, Friedrich August Gottreu: German Prot. theologian and preacher of wide repute: 1799, Mar. 30—1877, June 10; b. Breslau. He studied, first, at the univ. of his native city; and afterward at Berlin, where oriental studies claimed his special regard, whose first-fruits appeared in *Suffismus sive Theosophia Persarum Pantheistica* (Berl. 1821). The state of his religious opinions may be conceived from his own confession that when he left Breslau he thought nearly as much of Mohammedanism as of Christianity. The influence of Neander, however, and still more of Baron von Kottwitz, philanthropic Christian nobleman of Silesia, produced a radical change in his convictions and modes of thought; and as early as 1823 he appeared as a champion of evangelical doctrines in *Wahre Weihe des Zweiflers* (True Consecration of the Skeptic; 7th ed. Hamb. 1851—under the title *The Doctrine of Sin and the Propitiator;* transl. into English, French, Danish, Swedish, and Dutch). Next year he published *Auslegung des Briefs an die Römer* (Exposition of the Epistle to the Romans; Berl. 1824; 4th ed. 1842; also transl. into Eng. and other languages). About the same time he was appointed extraordinary prof. of theology at Berlin; and 1825 he visited England. On his return, 1826, he succeeded Knapp as ordinary prof. of theology at Halle, where, with the exception of a brief official sojourn at Rome, he remained. T.'s position at Halle was far from pleasant at first, for the majority of the theological faculty, among whom was Gesenius, were very decided rationalists, and did much to make the new professor's position uncomfortable; but T., though not a man of the profoundest intellect, was filled with a quiet, earnest, resolute *faith;* and he continued his evangelical labors against all opposition, until they reached full success. The Univ. of Halle is at present, mainly owing to T., as thoroughly Christian and evangelical, though not, perhaps, so strictly orthodox, as in the days of Francke. He wrought this result largely by the beauty and power of his personal character, and by his earnest preaching of Christ. In theology T. held to a liberal orthodoxy, or rather evangelicalism, which laid stress on personal experience rather than on rigid doctrinal tenets. He opposed externality in religion, whether of rationalism, sacramentarianism, or orthodoxy. He had a wide and generous culture. His kindness (with that of his wife) toward students, especially *poor* students, was proverbial, and gained for him wide fame and a deep personal love. In 1843 he was chosen a member of the consistory of Magdeburg, where he became superior councilor 1867. Besides the works above mentioned are: among his exegetical writings *Praktischer Commentar zu den Psalmen* (Practical Commentary on the Psalms; Hamb. 1843); *Commentar zum Evangelium Johannis* (Commentary on the Gospel of John; 6th ed. Hamb. 1844); *Commentar zum Briefe an die Hebräer* (Commentary on the Epistle to the Hebrews; 3d ed. Hamb. 1850); and *Philosophisch-theologische Auslegung der Bergpredigt* (Philosophico-theological Exposition of the Sermon on the Mount; 3d ed. Hamb.

1845). Of his dogmatic writings, the principal are in *Literarischer Anzeiger für Christliche Theologie und Wissenschaft*, a journal now discontinued; and in his *Glaubwürdigkeit der Evang. Geschicht.* (Credibility of the Gospel History; Hamb. 1837), treatise against Strauss's *Leben Jesu*. Among his contributions to history of theology are: *Vermischte Schriften grösstentheils apologetischen Inhalts* (2 vols. Hamb. 1839); *Der Geist der Luth. Theologen Wittenbergs im 17. Jahrh.* (The Spirit of the Lutheran Theologians of Wittenberg in the 17th C., Hamb. 1852); *Das Academische Leben des 17. Jahrh.* (The Academic Lif of the 17th C.; Halle 1853–4); and *Geschichte des Rationalismus* (History of Rationalism), in several parts—notably a *Vorgeschichte des Rationalismus*. Besides these are several volumes of sermons.

THOMAISM, n. *tō'mă-ĭzm*, or THO'MISM, n. *-mĭzm:* the doctrines of St. *Thomas* Aquinas. THO'MIST, n. *-mĭst*, a follower of St. Thomas Aquinas, a distinguished schoolman of the 13th c., who taught the doctrines of original sin and free grace, and condemned the doctrine of the immaculate conception (see AQUINAS).

THOM'AS, CHRISTIANS OF SAINT: remarkable religious community settled from a very early date on the Malabar coast of the Indian peninsula; named from the apostle Thomas, who, according to a very ancient but quite unsupported tradition, preached in India, and is regarded as the apostle of that country. As early as the 6th c., the well-known voyager Cosmas Indicopleustes, reported numerous Christian communities in India, under the pastoral care of bishops sent from Persia. To these Persian bishops it may be attributed that the Indian Christians, like those of what may be called the mother church of the Persian kingdom, lapsed into the Nestorian heresy, which, after the decrees of Ephesus and Chalcedon, having been suppressed by the civil laws of the Roman empire, was driven beyond the limits of Roman authority, and found its favored seat among the Persians. This sect had their seat almost entirely along the Malabar coast, and extended from the s. cape, Comorin, as far as Calicut; and they are found scattered throughout this length over the space from the w. declivity of the Ghauts to the sea. From the time of their lapsing into Nestorianism, their bishops were ordained by the Nestorian patriarch of Babylon, and they possessed certain civil rights under the successive dynasties in s. India. On the whole, however, they were much oppressed; and on the arrival of the Portuguese 1598, the Christians of St. T., though Nestorians, regarded them as their deliverers. Nevertheless, the diversity of creed was at once recognized by the western missionaries, and attempts were made by the Franciscans, Dominicans, and finally Jesuits, to reconcile them to the Roman Church. A union, more or less real, was effected by a synod at Diamper, 1599; and one of the Jesuit Fathers, Padre Roz, was named bp. 1601. This union, however, was not lasting; they fell away again from the Roman communion, and the expulsion of the Portuguese from Cochin by the Dutch

completed the disruption. A considerable number, however, were again united to Rome through missionaries of the Carmelite order; and toward the close of the 17th c., Emperor Leopold I. obtained leave of the Dutch to send a bp. and 12 priests of that order to the Malabar coast. Those missionaries were hindered in their work both with the schismatics and with the heathen by the intrigues and jealousies of the Portuguese. In later times, the Christians of St. Thomas have mostly been absorbed in the native Christian population. Their tenets were in the main those of the Nestorians of Chaldea and Mesopotamia, about whose precise details there has been controversy; and conflicting statements have been made, according to the religious views of travellers or missionaries. Much of this conflict of testimony arises from a confusion of names. See NESTORIAN.

THOMAS, *tŏm'as,* or DIDYMUS, *dĭd'ĭ-mŭs* ('Twin'): apostle of Jesus Christ: probably a Galilean (Jn. xxi. 2), though tradition refers his birth to Antioch in Syria. Tradition further speaks of him as preaching to the Parthians, the Persians, and suffering martyrdom in India, where the anciently named Thomas Christians, otherwise called Nestorians of India, point to his grave at Meliapur, contrary to another statement that he was buried in Edessa, Mesopotamia, whence it is said his relics were removed to Ortona, Italy. Of a piece with the fantasy of identifying the lost Ten Tribes with American Indians was a priestly theory of his visiting America and of his apotheosis as an Aztec god. The New Testament associates him with Matthew and with Philip, and narrates his interview with the risen Lord, when he desired proofs of the resurrection. An unwarrantable inference is drawn from this that he was of a skeptical nature. He felt it requisite to have visible proof of an amazing fact—such proof as had been given to the other disciples.

THOMAS, *tō-mä,* AMBROISE CHARLES LOUIS: French musical composer: b. Metz 1811, Aug. 5; d. 1896, Feb. 12. He studied in the Paris Conservatoire, and in 1832 gained the Grand Prix, which enabled him to continue his studies in Italy. Returning to France he began to write for the Opéra Comique, his first opera being *La double Echelle* (1837). Among his early operas may be cited also *Betty* (1846); *Le Caid* (1849), and opera bouffe; and *Le Roman d'Elvire* (1860). He is best remembered, however, by the more serious works of his later years, *Mignon* (1866); *Hamlet* (1868); and *Françoise de Rimini* (1882). He was appointed professor of composition at the Paris Conservatoire in 1852, and in 1871 succeeded Auber as director. His non-operatic works include a *Messe Solennelle* (1857), a *Marche Religieuse* (1865), cantatas, and chamber music.

THOMAS, ARTHUR GORING: English composer: b. Ralton Park, Sussex, 1850, Nov. 20; d. 1892, Mar. 20. He studied at Haileybury College and his musical education

was received at Paris, and at the Royal Academy of Music. His opera, *The Light of the Harem,* was given with acceptance while he was still a student at the academy. In 1883 his second opera, *Esmeralda,* was produced at Drury Lane Theatre and was warmly received. In 1885 followed *Nadeshda* and *The Golden Web.* Besides his operas he composed *The Sun Worshippers,* a choral ode, *Out of the Deep,* and *The Swan and the Skylark,* cantatas.

THOMAS, Augustus: American playwright: b. Saint Louis, Mo., 1859, Jan. 8. He was a special writer and illustrator on Saint Louis, Kansas City and New York newspapers, and was editor of the *Kansas City Mirror.* He is the author of the popular dramas, *Arizona; In Mizzouri; The Burglar; The Man Upstairs; On the Quiet; The Earl of Pawtucket,* and many others, of which *The Witching Hour* (1907) is the most important.

THOMAS, Cyrus: American archæologist and entomologist: b. Kingsport, Tenn., 1825, July 27. He was naturalist on the United States Geological Survey 1869-74 and professor of natural sciences in the Southern Illinois Normal University 1874-7; entomologist of Illinois 1875-82, and since 1882 ethnologist in the United States bureau of ethnology. His works include *Study of the Manuscript Troano* (1882); *Notes on Certain Maya and Mexican Manuscripts* (1884); *Mound Exploration* (1888); *pre-historic Works East of the Rocky Mountains;* etc.

THOMAS, Edith Matilda: American poet: b. Chatham, Ohio, 1854, Aug. 12; d. N. Y. City, 1901. She was educated at the State Normal School, Geneva, Ohio. Much of her verse was distinctly above the average, displaying not only very subtle feeling, but great delicacy of expression. She contributed to many periodicals, and published in book form: *A New Year's Masque,* etc. (1885); *The Round Year* (1886); *Lyrics and Sonnets* (1887); *Children of the Seasons,* series (1888); *Babes of the Year* (1888); *Babes of the Nations* (1889); *Heaven and Earth* (1889); *The Inverted Torch* (1890); *Fair Shadow Land* (1893); *In Sunshine Land* (1895); *In the Young World* (1895); *A Winter Swallow and Other Verse* (1896); etc.

THOMAS, George Henry: soldier: 1816, July 31—1870, Mar. 28; b. Southampton co., Va. He left the study of law for a cadetship at West Point, where he graduated with honor 1840, and became 2d lieut. of artillery, gaining a brevet in the Fla. Indian war. On duty in Tex. at the beginning of the Mexican war, he was brevetted capt. for gallantry at Monterey; and received special mention and was brevetted major for effective service at Buena Vista. He was instructor of artillery and cavalry at West Point 1851-54; and the following year major of the 2d cavalry. While absent in 1861, his regiment was surrendered by treachery in Texas and

returned n. *via* that city; he reorganized it for Union service, never wavering in his loyalty, though of southern birth. At the head of a brigade, he defeated a militia force in Va. near the Potomac; and Aug. 17 he was appointed brig.gen. of vols. in the dept. of the Cumberland, then in confusion and danger. He organized raw material into the 1st brigade at Camp Dick Robinson; and at the battle of Mill Springs was gained the first cheering victory. He participated in all the campaign ending in Shiloh; was promoted maj.gen. 1862, Apr. 25; and succeeded Gen. Grant in command of the Army of the Tennessee and of the right wing in Halleck's advance on Corinth (1862, Apr. 9—May 30), but at his own request was returned to his former command of a division in Buell's army, because he had learned that Gen. Grant felt that he had suffered an injustice in the removal. This magnanimous act was characteristic of this chivalrous soldier. He commanded the centre, 5 divisions, when the Union forces were massed at Nashville to meet Gen. Bragg. At the battle of Stone river, 1862, Dec. 31—1863, Jan. 2, Gen. Thomas's wonderful ability and persistency in holding his ground were conspicuous, as repeatedly afterward; except for this, and his fearless assault the third day, the battle would have been lost. After flanking movements, resulting in the occupation of Chattanooga by the Union forces, occurred the great battle of Chickamauga (q.v.), where for more than five hours, with 25,000 men in a semicircle of which T. was the centre, he withstood the repeated assaults of the 65,000 Confederates flushed with their victory over the rest of the Union army. It is said that the result of this contest destroyed the over-confidence of the enemy ever after. Gen. Thomas (known from that day as the 'Rock of Chickamauga'), now in command of the Army of the Cumberland, sustained the critical siege of Chattanooga—replying to Gen. Grant, 'We will hold the town till we starve,' though he had but 5 days' provision for 50,000 mouths. The battles of Mission Ridge and Lookout Mt., Nov. 23–25, ensued; he carrying the Ridge and driving the enemy in confusion: see CHATTANOOGA, BATTLES OF. Then followed the Atlanta campaign of 1864, in which he commanded two-thirds of Gen. Sherman's army, the centre, in 100 days' fighting—his troops the first to enter Atlanta. When Gen. Hood threatened the base of supply, T. was sent to Nashville, where his usual wise caution in completing all needed organization before striking his sure blows led to the usual impatience at Washington; an order was even made out to suspend him from command, but Gen. Grant, who knew him well, succeeded in holding it back until Dec. 15 and 16, when, with all the disadvantages of poor supplies and equipments, bad weather, and crossing rivers without pontoon-bridges, Gen. T. fought the battle of Nashville, completely routing Gen. Hood, and practically ending the war in the west. For this he was made maj.gen. U. S. army, and received the thanks of congress, and a gold medal from the Tenn. legislature. Cavalry operations in Ala. and Ga. followed till the end of the war, after which he commanded the division

of the Pacific until his death. He was buried at Troy, N. Y. A man of admirable personal qualities, and of much literary and scientific cultivation, he was distinguished by a lofty integrity and honor, and was recognized as a model soldier, in whom his men had a just confidence that rendered them invincible. A bronze equestrian statue of Gen. T., by J. Q. A. Ward, at Washington, is a testimony from his soldiers. His biography by Thomas B. Van Horne was pub. 1882.

THOM'AS, Hiram Washington, D.D.: pastor emiritus of the People's Church, Chicago: b. in West Va., 1832, Apr. 29. After education at the Cooperstown Acad. and the Berlin Theol. Seminary, he was appointed to stations of the Meth. Episc. Church in Penn. 1851–55, and in Iowa 1855–69, after which he had charge successively of the Park Ave. and the First Meth. Episc. Churches, Chicago, 1869–75, a church in Aurora, Ill., and 1877–80 the Centenary Church in Chicago. In 1881 he was tried for heresy and expelled from Methodist Church. Pastor of People's Church 1880–1901; chaplain 1st Regt., I. N. G. from 1881. Was president of the Congress of Religion. Wrote: *Origin and Destiny of Man; The People's Pulpit; etc.*

THOM'AS, John: soldier: 1725–1776, June; b. Marshfield, Mass., where, and in Kingston, he practiced medicine. In 1746 he was surgeon of a regt. sent to Novia Scotia, and the next year on the staff of Gen. William Shirley, becoming col. of provincial troops 1759. He commanded a regt. under Gen. Amherst at Crown Point 1760, and the left wing of the army under Col. Haviland in the expedition that captured Montreal. After resuming his profession in Kingston, Mass., for some years, he enlisted a regt. of vols. 1775, and was made brig.gen. by congress, but withdrew from service until a resolution of congress, following highly commendatory letters from Gen. Washington and others, gave him his merited precedence. In the siege of Boston, he was at the head of a brigade, and his action in seizing Dorchester Heights compelled the British to evacuate the city. Two days afterward he was promoted maj.gen., and subsequently commanded the Canada forces, with which, reduced to less than 700 effective men against a reinforced enemy, he was compelled to retire from Montreal to Three Rivers, near which he died of smallpox.

THOMAS, Joseph, M.D.: philologist and editor: b. Cayuga co., N. Y., 1811, Sep. 23—1891, Dec. 24. He was educated at Yale Coll. and at the Rensselaer Polytechnic Institute, Troy, N. Y.; studied medicine and practiced in Philadelphia. He was prof. of Greek and Latin in Haverford Coll., and spent nearly 2 yrs. in India and Egypt, studying Sanskrit, Arabic, and other languages. He edited biographical and geographical vocabularies for *Webster's Dictionary*, was one of the editors of *Lippincott's Gazetteer*, and sole editor of a *Medical Dictionary* and a *Dictionary of Biography and Mythology*.

THOMAS, St. (island): see St. Thomas.

THOM'AS, Theodore: musician: b. Esens, Hanover, Germany, 1835, Oct. 11; d. Chicago, 1905, Jan. 4. Taught by his father, he played the violin in public at the age of six. In 1845 he came with the family to this country; later he was with the Italian Opera Co., visiting the chief cities, and played 1st violin in the tours of Jenny Lind, Sontag, Grisi, and Mario; also orchestral leader in those of La Grange, Piccolomini, and Thalberg, and conductor of Italian and German opera. In 1864, he organized the Thomas Orchestra, and began his symphony concerts in New York, which he continued until 1878; he also made several concert tours, the first in 1869. In 1872 he founded the Wagner Union to aid in the Baireith festival of 1875. For four years from 1878, he was director of the College of Music in Cincinnati; excepting these years, he conducted the New York Philharmonic Society after 1876, and that of Brooklyn after 1862, until 1891. He conducted eight musical festivals in Cincinnati, and was musical director of the World's Fair in Chicago in 1893. In 1891, he removed to Chicago, and was conductor of the Chicago Orchestra; under his leadership a new Orchestral Hall was built, and dedicated less than a month before his death. More than any other leader he has raised the standard of music in this country.

THOM'AS, Theodore Gaillard, m.d.: physician: b. Edisto Island, S. C., 1831, Nov. 21; d. Thomasville, Ga., 1903, Feb. 28. He received his medical degree from Charleston Coll. 1852, and then settled in New York, serving in Bellevue Hospital. He was prof. of obstetrics and women's diseases in the N. Y. Coll. of Physicians and Surgeons, and consulting physician of various hospitals. He held high rank both as a practitioner, and as a lecturer and writer. His *Practical Treatise on Diseases of Women* (1868) has been translated into several languages.

THOMAS À BECKET: see Becket.

THOMAS À KEMPIS: see Kempis.

THOMASITES, n. plu. *tŏm'as-īts* [from John *Thomas*, m.d., b. London, 1805, d. Worcester, Mass., 1871]: name sometimes given to the Christadelphians, from the fact that Dr. Thomas organized them into a separate religious body. They believe that immorality is the reward of the righteous —i.e., of those who receive the truth and are baptized; and that others will perish from existence after punishment proportioned to their misdeeds or lack of faith. They reject the doctrine of the Trinity.

THOMASIUS, *to-mâ'zē-ûs*, Christian: 1655, Jan. 1—1728, Sep. 23; b. Leipzig: German philosopher and jurist. He studied at Frankfurt-on-the-Oder 1675–79, and, returning to his native town, gave lectures on law in a style startlingly independent of the traditions of the schools. In 1687, to the astonishment of his Latin-speaking colleagues, he adopted the German language in his expositions; published his programme for the following year in the

same tongue; and began a monthly journal, which excited so much opposition that he left Leipzig, and went first to Berlin, and afterward (1690) to Halle, where, under the patronage of the Brandenburg court, his lectures were the means of establishing the university. In this univ., T. became prof. of jurisprudence. The great aim of T. was to harmonize and blend science and life—hence his contempt for hair-splitting subtleties of which nothing could be made; his preference of German to Latin in his academic lectures; his disinclination to all philosophical terminology; his depreciation of the schoolmen; his demand for the freeing of jurisprudence from the control of theology; etc. But particularly he signalized himself as an opponent of trial for witchcraft and punishment by torture. T., as a thinker, rational, practical, independent, and eclectic rather than profoundly systematic, prepared the way for great reforms in philosophy: see his *Geschichte der Weisheit und Thorheit* (History of Wisdom and Folly). —See Luden, *Christian Thomasius* (1805); and works on T. by Dernburg (1865) and Wagner (1872).

THOM'AS THE RYM'OUR, or THOM'AS OF ERCILDOUNE, *ėr'sĭl-dôn:* earliest poet of Scotland: about 1225–1300. The history of his life and writings is involved in obscurity. He derived his territorial appellation from the village of Ercildoune (now Earlstoun), in the county of Berwick. Whether the name Rymour (Rimer) was given him from his poetical work, or was a family name, has been somewhat discussed. He appears to have reached the height of his reputation in 1286, when he is said to have predicted the death of King Alexander III.: this singular prophecy is recorded in the *Scotichronicon* of Fordun 1430; also by the historian Boece 1527. He was believed to have derived his prophetic gift from his intercourse with the queen of fairyland, with whom the legend made him a resident during seven years of his early youth, and to whom he was said to have mysteriously returned at last. Compare the myth of TANHÄUSER (q.v.).

T. is famed chiefly for the prophecies attributed to him. Sir Walter Scott believed him the author of the famous romance of *Sir Tristrem*, which is his chief work extant: this authorship, however, is doubted by some. The other poems attributed to him, chiefly descriptive of his interviews with the fairy queen, and his adventures in fairyland, display poetical power of high order. These have been edited by Dr. J. A. H. Murray for the Early English Text Soc. (1876), and by Brandl (1878).

THOMASTON: town in Knox co., Me.; on St. Georges river and on the Knox and Lincoln railroad; 4 m. w.s.w. of Rockland. It has 5 churches, 2 public libraries, graded schools, and 1 weekly and 1 monthly periodicals, and is the seat of the Maine State Prison. It has quarries of granite, and is noted for its extensive manufacture of lime. Pop. (1890) 3,009; (1900) 2,688; (1910) 2,205.

THOMASVILLE, *tŏm'as-vĭl:* town, cap. of Thomas co., Ga.; on the Savannah Florida and Western railroad; 200 m. w.-by-s. of Savannah. It is in a cotton, wool, and pine-woods region; is widely known as a popular winter resort and sanitarium for consumptives; has iron-works, machine-shops, and cotton-seed-oil mills; and contains co. court house, several churches and hotels; a branch of the State University, called the South Georgia College of Agriculture and Mechanical Arts: the Young Female College; a public library, and graded schools. There are daily and weekly newspapers, 1 national bank (cap. $100,000), 3 state banks, a savings bank and trust company. Pop. (1900) 5,322; (1910) 6,727.

THOMISM, n. *tŏm'ĭzm:* in *chh. hist.*, one of the two great schools of scholasticism, the other Scotism (see SCOTUS, DUNS). It derived its name from its founder, St. Thomas Aquinas (q.v.).

THOMPSON, *tŏmp'son:* town in Windham co., Conn.; on the Quinebaug river and the New York, New Haven and Hartford railroad; 4 m. n.e. of Putnam, 38 m. n.-by-e. of Norwich. It contains several villages, a number of churches, graded schools, and cotton and woolen goods factories. Pop. (1900) 6,442.

THOMP'SON, Sir BENJAMIN: see RUMFORD, Count.

THOMP'SON, ELIZABETH: see BUTLER, ELIZABETH SOUTHERDEN.

THOMP'SON, GEORGE: reformer: 1804, June 18—1878, Oct. 7; b. Leeds, England. He was a leader in the agitation for abolition of slavery in the British colonies; visited the United States 1834 to advocate abolition in this country; and during his sojourn, though often in peril for his life from mob violence, was instrumental in establishing more than 150 abolition societies. He revisited America 1851, and again during the secession war: during the latter visit he was honored with a public reception by the house of representatives in Washington. He helped to prevent recognition of the Confederacy by England. He once served in the British parliament as member for the Tower Hamlets (1847). In recognition of his service to the cause of abolition, a fund was raised and presented to him toward the close of his life by admirers in England and America.

THOMP'SON, HUGH MILLER, S.T.D.: Prot. Episc. bishop: b. County Londonderry, Ireland, 1830, June 5. Brought by his parents to Ohio, while yet a child, he was educated in the schools of Cleveland; studied theol. at Nashotah House, Wis., ministered as deacon in Madison, Wis., Maysville, Ky., and missionary in Wis.: as priest at

Portage and Milwaukee, Wis., and rector in Kenosha, Wis., and Galena, Ill. In 1860 he became prof. of eccles. hist. at Nashotah House, and ed. of the *Amer. Churchman;* 1871 rector of St. James, Chicago; 1872 of Christ Ch., New York, and ed. of the *Church Journal;* 1875 rector of Trinity Chh., New Orleans; 1883 asst. bp., and 1887 bp. of Mississippi. Dr. T. published *Unity and its Restoration* (1860); *Sin and its Penalty* (1862); *First Principles* (1868); *Absolution* (1872); *Copy: Essays from an Editor's Drawer* (1872); *Is Romanism the Best Religion for a Republic?* (1873); *Concerning the Kingdom of God* (1873); *The World and the Logos* (Bedell lectures 1885); *The World and the Kingdom* (1888). He died 1902, May 18.

THOMP'SON, Jacob: politician: 1810, May 15—1885, Mar. 24; b. Caswell Co., N. C. Having graduated at the Univ. of N. C. 1831, he was admitted to the bar 1834, and practiced law in the Chickasaw country, Miss., till 1838. He was representative in congress 1839–57; sec. of the interior 1857–1861, Jan. 8, when he resigned on the issuance of the order to reinforce the garrison of Fort Sumter. He was gov. of Miss. 1862–64. In 1864 he was Confederate commissioner in Canada, and promoted plans for the capture of Camp Douglass, near Chicago, and release of the prisoners of war there confined. He was accused of instigating plots to fire northern cities and of complicity in the assasination of President Lincoln. He fled to Europe but returned to the U. S. and was not brought to trial.

THOMP'SON, Joseph Parrish, d.d., ll.d.: Congregational minister and author: 1819, Aug. 7—1879, Sep. 20; b. Philadelphia, Penn. He graduated at Yale 1838, and afterward from the Yale Divinity School; was pastor of the Chapel St. Congl. Church, New Haven, 1840–45, and a founder of the *New Englander* review; and was pastor of the Broadway Tabernacle, New York, 1845–71. He was distinguished as a preacher of learning and force, an active promoter of his denomination in the metropolitan district and elsewhere (one of the organizers of the first Congl. convention, at Albany 1852), a prolific writer for the press, and a founder of the N. Y. *Independent;* also as a specialist in Egyptology. In reforms, especially anti-slavery, he was prominent. In 1852–3 he visited the Orient. He lectured on Egyptology at Andover 1871. Having resigned his charge in New York, he removed to Berlin, Germany, 1872, and resided there until his death, engaged in his favorite studies, and meanwhile doing much to diffuse information in regard to his native country. In 1875 he received the thanks of the German govt. for explaining its position toward Ultramontanism, in addresses made while on a visit to England. His scholarly attainments were honored by foreign learned societies, of which he was an active member. He published: *Memoir of Timothy Dwight* (1844); *Lectures to Young Men* (1846); *Hints to Employers* (1847); *Memoir of David Hale* (1850); *Stray Mediations* (1852); republished as *The Believer's Refuge; The Invaluable Possession* (1856); *Egypt, Past and Present* (1856); *The Early Witnesses* (1857); *Memoir of Rev. David T. Stoddard*

(1858): *The Christian Graces* (1859); *The College as a Religious Institution* (1859); *Love and Penalty* (1860); *Bryant Gray* (1863); *The Holy Comforter* (1866); *Man in Genesis and Geology* (1869); *Theology of Christ, in His Own Words* (1870); *Home Worship* (a manual, 1871); *Church and State in the United States* (1874); *Jesus of Nazareth—His Life for the Young* (1875); *The United States as a Nation* (1877); *The Workman: His False Friends and His True Friends* (1879).

THOMP'SON, Launt: sculptor: 1833, Feb. 8—1894 Sept. 26: b. in Ireland. In Albany, N. Y., he began the study of medicine, but became pupil and asst. of the sculptor E. D. Palmer for 9 years, producing portrait and ideal heads of merit. Removing to New York 1858, he was busily employed on orders for medallion portraiture; exhibited a remarkable group in the round, entitled *The Trappers;* was elected academician 1862, and vice-pres. of the National Acad. 1874. He has twice resided in Italy. Besides ideal works, he has produced statues of noted men at Yale, West Point, etc.; an equestrian statue of Gen. Burnside in Providence, R. I.; a bust of Bryant in the Metropolitan Museum, New York; and other works no less deserving.

THOMPSON, James Maurice: essayist and poet: b. Fairfield, Ind. 1844; d. 1901, Feb. 15. In childhood he was taken by his parents to Georgia, and there he was educated. During the Civil War he served in the Confederate Army. Afterward he returned to Indiana and resided there, passing his winters in the south. He was a lawyer by profession but his predilection was for the study of nature, and he loved an outdoor life. From 1885 to 1889 he was chief of the department of Natural History and was state geologist of Indiana. His poems were the direct expression of the sights and sounds of nature, interpreted by a mind full of sympathy. But he was also a student of books and a master of style, although his own books show him rather as a nature-lover than a scientist. Among his works are: *Byways and Bird Notes; Sylvan Secrets; Songs of Fair Weather; Hoosier Mosaics; A Tallahassee Girl; My Winter Garden; Alice of Old Vincennes; Sweetheart Manette;* and *Milly.* For 15 years he was on the editorial staff of the *Independent.*

THOMP'SON, William: soldier: about 1725–1781, Sep. 4; b. Ireland. He was a citizen of Penn., and commanded the first battalion of troops raised in response to the demand of the continental congress after the fight at Lexington. His 8 companies reached the camp at Cambridge, Mass., 1775, Aug. 14, and Nov. 10 repelled a British landing party at Lochmere Point. Commissioned brig.-gen. 1776, he relieved Gen. Charles Lee of the command at New York, and was ordered to Canada with 10 regts. to reinforce Gen. John Thomas. He joined the northern army on its retreat from Quebec, and took the chief command, *vice* Thomas, invalided. Gen. Sullivan assumed the chief command shortly afterward, and in the fight at Trois Rivières T. was taken prisoner: he was held two years.

THOMP'SONVILLE: town in Hartford co., Conn.; on the Connecticut river, and on the New York New Haven and Hartford railroad; 8 m. s. of Springfield, 17 m. n.-by-e. of Hartford. It has 1 private bank, 1 trust company, and 1 weekly newspaper; and is noted for its manufactures of carpets.—Pop. 7,200.

THOM'SON, CHARLES, LL.D.: patriot and scholar: 1729 Nov. 29—1824, Aug. 16; b. Ireland. He came to America with his parents 1740; was educated in Dr. Allison's seminary, New London, Penn., was the friend of Benjamin Franklin, and was known by white men and Indians as a man of incorruptible integrity. He was an enthusiastic patriot, and traveled throughout the country preparing the farmers for the struggle with England. He was unanimously chosen clerk of the 1st continental congress. He published a translation of the Septuagint and New Test. 1808, and a *Synopsis of the Four Evangelists* 1815.

THOM'SON, Sir CHARLES WYVILLE, LL.D., F.R.S.: naturalist: 1830, Mar. 5—1882, Mar. 10; b. Bonsyde, Scotland. He was educated in the Univ. of Edinburgh; became lecturer on botany in the Univ. of Aberdeen 1850, prof. nat. hist. in Queen's Coll., Cork, 1853; but was transferred to Queen's Coll., Belfast, 1854. He had his first experiences in sea-bottom dredging 1868–9; and became Regius prof. of nat. history in Edinburgh Univ. 1870. He sailed in the great *Challenger* expedition as head of the scientific dept., 1872, Dec. 7; returning 1876, May 27, after a cruise of about 68,000 m. He told the story of his early dredging expeditions in *Depths of the Sea* (1872); his later observations are given in *The Voyage of the Challenger*.

THOM'SON, JAMES: author of *The Seasons:* 1700, Sep. 11—1748, Aug.; b. Ednam, in Roxburghshire, of which parish his father was minister. He was put to school at Jedburgh, and passed to the Univ. of Edinburgh. His intention was to enter the ministry, and he took a full course of study with that view; but from a very early age he had had a liking for verse; and 1725 he went to London, to seek fame and fortune as a poet. Soon he drifted to the neighborhood of Barnet; and there, with few friends, without employment and without money, and saddened by his mother's death, he produced his first poem, *Winter* —congenial to his cheerless state of mind. This, with some delay and difficulty, he disposed of to a publisher 1726 for three guineas; and as its success was not instant, his outlook was not hopeful. Gradually, however, the merits of the poem were recognized; successive editions were soon called for; friends and patrons were not lacking to the young author; and in no long time T. found himself a poet of high repute. The *Winter* was followed 1727 by the poem *Summer; Spring* was pub. 1728; and *Autumn*, completing *The Seasons*, 1730, with reissue of the previous portions. In 1729 T. produced the tragedy *Sophonisba;* but though great expectations were formed of it, its success on the stage was small. 1730–33 T. was in Paris and elsewhere with the son of Sir Charles Talbot, the chancellor;

and on his return, at the death of his pupil, the comfortable place was bestowed on him of sec. of the briefs. This he held till it lapsed, on the death of the chancellor 1737, which left him again in straits, which were alleviated by a pension of £100 a year by the Prince of Wales. His tragedy of *Agamemnon*, 1738, had no success; and his poem on *Liberty*, by himself considered his greatest work, found small favor with the public. His *Tancred and Sigismunda*, 1745, was more successful. About this time, the accession to power of his friend Lyttleton secured him the office of surveyor-gen. of the Leeward Islands, which, however, he did not long live to enjoy. He was buried in the church at Richmond, and a monument was afterward erected to his memory in Westminster Abbey. In the spring before his death he published his most finished and elaborate poem, *The Castle of Indolence*, written in the Spenserian stanza, with all the descriptive power and opulence of imagination, and manifestation of his own generous and noble personal qualities, which distinguished his more popular *Seasons*. Together, they maintain for T. a high place in the roll of British poets. His other works, except the song *Rule Britannia*, are now forgotten. *Winter* ranks as his best work, produced in the freshness of his powers, with less elaborate attempt at classical finish than in his later productions. T. was the most popular poet in the English language, previous to Scott and Byron. As a man, he was singularly amiable; and his careless generosity of disposition seems to have endeared him to all who knew him.

THOM'SON, James Bates, ll.d.: educator: 1808, May 21—1883, June 22; b. Springfield, Vt. He gained an education by attending a district school in winter, for he had to labor on his father's farm in the summer. He became a schoolmaster 1824; graduated at Yale Coll. 1834; was principal of the Nantucket, Mass., acad. 1835-42. Settling in Auburn, N. Y., 1843, he was organizer of teachers' institutes throughout N. Y. for many years. He prepared an abridgment of Day's *Algebra* (1843), for the use of schools, and was author of a series of text-books of arithmetic which for some time had a total sale of 100,000 copies a year.

THOM'SON, Mortimer (pen-name 'Q. K. Philander Doesticks, p.b.'): humorist: 1832, Sep. 2—1875, June 25; b. Riga, N. Y. He was for a short time a student in the Univ. of Mich., then went on the stage; subsequently was a travelling salesman, and then engaged in writing for newspapers. He came into public notice through his rhymed police-court reports and some sketches of fortune-tellers in New York; and his report of a sale of slaves in S. C. won for him a national reputation. T. was for many years a lyceum lecturer, delighting audiences throughout the United States with his humorous and sarcastic comments on men and affairs, especially with his rhymed lecture on 'Pluck.' He was author of several volumes.

THOMSON, Thomas: British chemist: b. Crieff 1773, Apr. 12; d. near Holy Loch 1852, July 2. He was educated at Crieff, Stirling, and the University of Saint Andrews, and in 1799 graduated M.D. at Edinburgh. He edited the supplement to the third edition of the *Encyclopædia Britannica,* to which he contributed the articles *Chemistry, Mineralogy,* and *Vegetable, Animal, and Dyeing Substances.* In the article *Mineralogy* he used the system of symbolic representation, but it is incorrect to describe him as the introducer of this auxiliary of chemical science. In 1880, on the completion of the *Encyclopædia,* he began a course of lectures on chemistry, which he continued till 1811, opening, in addition, a laboratory for practical instruction in chemistry, about the first institution of the kind in Great Britain. In 1802 he published the first edition of his *System of Chemistry,* which obtained rapid success both in Great Britain and on the Continent. In 1810 he published his *Elements of Chemistry.* His *History of the Royal Society* appeared in 1812. In 1813 he went to London and began there a scientific journal, the *Annals of Philosophy,* which he continued to edit till the end of 1820. The lectureship in chemistry in the University of Glasgow was conferred on him in 1817, the office being shortly afterward raised to a professorship, and he himself created regius professor of chemistry in 1818. His work on the atomic theory was published in two volumes in 1825, under the title of *Attempt to Establish the First Principles of Chemistry by Experiment.* The accuracy of the work was severely criticized by the Swedish chemist Berzelius. Thomson discovered a large number of chemical compounds, such as hyposulphurous acid, chlorochromic acid, and a great variety of salts. In 1830-1 he published his *History of Chemistry,* and in 1836 appeared his *Outlines of Mineralogy and Geology.* In 1846 he retired from his professional duties.

THOMSON, William: English archbishop: b. Whitehaven 1819, Feb. 11; d. 1890, Dec. 25. He was educated at Queen's College, Oxford, of which he was successively fellow, tutor, and head. Ordained deacon in 1842, he was curate at St. Nicholas, Guildford, and Cuddesdon, near Oxford, 1842-7, when he was made tutor of his college, of which he became provost in 1855. In 1861 he edited a series of essays by various writers under the title *Aids to Faith,* intended as a counterblast to *Essays and Reviews;* and in that year was appointed bishop of Gloucester and Bristol. In February, 1863, he became archbishop of York. He was the outhor of: *An Outline of the Necessary Laws of Thought* (1842); *The Atoning Work of Christ, viewed in Relation to Some Current Theories* (1853); *Crime and its Excuses* (in Oxford Essays, 1855); *Life in the Light of God's Word; Limits of Philosophical Inquiry; Design in Nature;* and a series of essays entitled *Word, Work and Will.*

THOMSON, William, 1st Lord Kelvin: British mathematician and physicist: b. Belfast 1824, June 26; d. 1907, Dec. 17. He was graduated from Cambridge in 1845, and even in 1841 gave proof of great mathematical ability by a paper *On the Uniform Motion of Heat in Homogeneous Solid Bodies, and in Connection with the Mathematical Theory of Electricity,* contributed to the *Cambridge Mathematical Journal.* In 1845 he became first editor of the *Cambridge and Dublin Mathematical Journal,* a post which he held for seven years. He was appointed professor of natural philosophy in the University of Glasgow in 1846, and occupied this position for 53 years, till his resignation in 1899. His jubilee as a professor was celebrated in 1896 by many brilliant university functions, and distinguished men of science came from many countries to do him honor. Lord Kelvin's contributions to physical science and its applications are very numerous. In all the domains of dynamics, sound, light, heat, magnetism, and electricity there are achievements to his credit. The form in which the mariner's compass is now generally employed was patented by him in 1876, and the siphon recorder used in connection with almost all submarine cables was introduced by him in 1867. His extremely delicate mirror galvanometer was also originally invented for the purposes of submarine telegraphy, and in this connection his automatic curb sender is also worthy of notice. His quadrant and absolute electrometers are well known to the student of electrostatics, and his portable electrometer and water-dropping apparatus are of great use in practical meteorology. He has published important papers on the theory of magnetism, and the theory of electric images with the associated method of electric inversion is due to him. Lord Kelvin was the first to direct the attention of scientific men to Sadi Carnot's pioneer work in thermodynamics, and it is mainly to his researches and those of Rankine and Clausius that we owe the present advanced condition of that science. The absolute scale of temperature based on the second law of thermodynamics was first proposed by Lord Kelvin. In the building up of the great modern doctrine of the conservation of energy he has taken an important part, and the portion of that doctrine known as the dissipation of energy is almost entirely due to him. He has also propounded a modified atomic theory in which the atoms are conceived as vortices, and he has thrown much light on such questions as the age of the earth, cosmic evolution, and geological time. Lord Kelvin, then William Thomson, was associated as electrician with the company which undertook the laying of an Atlantic cable in 1857, and was largely responsible for the success which ultimately crowned this pioneer effort of submarine telegraphy in 1866. He might, indeed, be called the first electrical engineer. He was knighted in 1866, and in 1892 was raised to the peerage as Baron Kelvin of Netherall, Largs, Ayrshire. He received many

other honors from many lands. He was president of the Royal Society from 1890 to 1895, and has been awarded the Copley and Royal medals. In 1871 he presided over the meeting of the British Association at Edinburgh. He was Rede lecturer at Cambridge in 1866 and was repeatedly elected president of the Royal Society of Edinburgh. He was awarded the Prix Poncelet by the Institute of France in 1874, and the Helmholtz medal by Germany in 1892. Lord Kelvin's most important published work is the well-known *Treatise on Natural Philosophy* (part i., 1867; new ed. 1879), written with Prof. Tait. An abridged edition has also been published. His other works are: *Papers on Electrostatics and Magnetism* (1873); *Mathematical and Physical Papers* (1882, 1884, 1890); *Popular Lectures and Addresses*, and articles in the 9th edition of the *Encyclopædia Britannica*.

His elder brother, JAMES T., prof. of civil engineering in Glasgow, made improvements in the construction of turbines and other engines (see WATER-POWER): but was best known by his splendid discovery that the freezing-point of water is lowered by pressure, and by his glacier-theory founded on it. See HEAT; ICE; REGELATION.

THOM'SON, WILLIAM MCCLURE, D.D.: missionary and author: b. Spring Dale, O., 1806, Dec. 31; d. 1894. He graduated at Miami Univ. 1826; studied theol. at Princeton; and was missionary of the Amer. and Presb. boards in the Orient—in Jerusalem 1832-3, and Beirut 1833-76; and then returned to this country. He published an original and very helpful work, illustrating Bible scenes and manners, *The Land and the Book* (1859); also two similar works, *The Land of Promise* (1855), and *Lebanon, Damascus, and Beyond Jordan* (1886).

THOMSONITE, n. *tŏm'sŏn-īt* [after Dr. *Thomson*, a Glasgow professor of chemistry]: a mineral of the zeolite family, of a whitish color, occurring in rectangular prisms in cavities in amygdaloid, basalt, greenstone, and old lava.

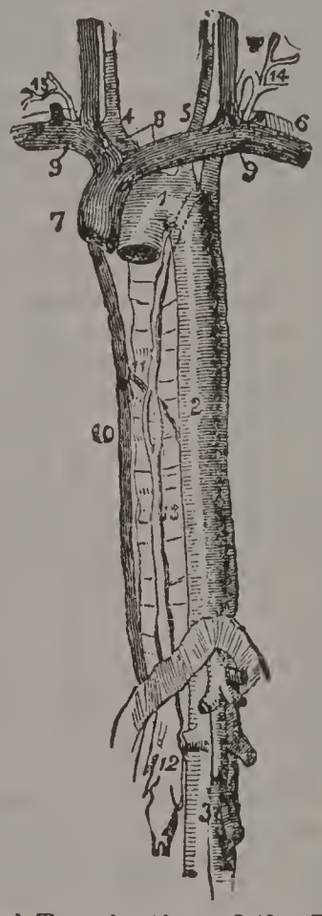
THONG, n. *thŏng* [AS. *thwang*, a strap: Icel. *thvengr*, a latchet]: a thin leather strap or leather string, used for fastening anything; the striking part of a whip.

THOR, n. *thŏr* [Icel. *Thorr;* AS. *Thunor:* the same word as *thunder*]: in *Scand. myth.*, son of Odin, the supreme god, and of Yörd (Earth); the god of thunder, winds, showers, and the weather, after whom is named the fifth day of the week, *Thursday*. His palace, supported on 540 pillars, was called Thrudwanger; here he received the warriors that had fallen in battle. Thunder was caused by the rolling of his chariot, drawn by he-goats. He was in the vigor of youth, had a red beard, and was the strongest of all gods and men; the gods even called in his assistance when they were in straits. He was, in particular, a terror to the Giants (q.v.), with whom he was perpetually at strife, and whom he struck down with his hammer Miolnir, which had the prop-

erty of returning to his hand after being hurled; it had been made by cunning dwarfs. The sign of the hammer was among the heathen Teutons analogous to that of the cross among Christians. In the contest at the twilight of the gods, T. slew the serpent of Midgard, but fell at the same time poisoned by the venom exhaled from its mouth. —The name of T. was widespread. The Saxons worshipped him as Thunar (High German, *Donar*). Torden, the wrathful deity dreaded by the Lapps, who in his rage hurled down huge blocks from rocks, tore up trees, destroyed cattle and men, is evidently the Scandinavian Thor. The Gallic god Taranis—in an old inscription Tanarus—mentioned by Lucan, also appears identical, especially as *torrunn* in the Celtic languages still signifies thunder. The attribute of thunder is intimately associated with the Latin Jupiter and the Greek Zeus (see these titles: also INDRA). Of all the Asa-gods, T. had unquestionably the most worshippers. In Upsala, according to Adam of Bremen, he occupied the place of honor in the temple between Odin and Frikke. In Norway, T. was the national god, and here, as in Iceland, temples were almost exclusively erected to him. Offerings were made to him, particularly in times of pestilence. On the ground of the superior respect given to T., and of his being called 'Old Thor,' some place him in opposition to Odin, and consider him historically as an older divinity, only partly supplanted by the Odin doctrine. As rude force is the predominating element in T., the humorous element in the Scandinavian belief attaches to him. Thus, the giants often blinded him by magic, and made fun of him; yet he always shows his extraordinary strength in these cases, and in the long run his opponents are invariably overcome by his hammer. The name Thor survives in numerous names of places (Thuneresberg, in Westphalia; Thunderhill, in Surrey; Thurso), also in personal names (Thorburn, in Scand. Thorbiörn).—See SCANDINAVIAN MYTHOLOGY.—Compare Uhland, *Der Mythus von Thor* (Stutt. 1836); Grimm, *Deutsche Mythologie.*

THORAC'IC DUCT: canal equal in diameter to a goose-quill, proceeding from the *Receptaculum Chyli* (into which the contents of the lacteals are collected, and which is in the front of the body of the second lumbar vertebra): it ascends along the front of the vertebral column, between the aorta and ascending vena cava, as high as the fourth dorsal vertebra; it then inclines to the left, and, passing behind the arch of the aorta, ascends as high as the seventh cervical vertebra, when it bends forward and downward, and terminates at the point of union of the subclavian and internal jugular veins of the left side, where it is provided with a pair of semilunar valves, which prevent the admission of venous blood into it. It is provided with other valves on its upward course. This duct is not liable to any special diseases; but if its function of conveying chyle from its source into the general circulation be interfered with—e.g., by the pressure of a tumor—the due nutrition of the system is checked.

THORAX, n. *thō'răks* [L. *thorax* or *thorācem*, the breast, defensive armor for the breast: Gr. *thōrax*, the breast, a breastplate]: in *anat.*, the chest; the part of the body between the neck and the abdomen, containing the heart, lungs, etc. (see CHEST). THORACIC, a. *thō-răs'ĭk*, of or pertaining to the thorax. THORACIC DUCT, the great trunk which conveys the contents of the lacteals into the blood (see above). THORAC'ICS, n. plu. *-ĭks*, order of bony fishes having the ventral fins placed beneath the pectorals.



The Course and Termination of the Thoracic Duct:

the arch of the aorta; 2, the thoracic aorta; 3, the abdominal aorta; 4, arteria innominata; 5, the left carotid; 6, the left subclavian; 7, the superior vena cava, formed by the union of 8, the two venæ innominatæ; and these by the junction, 9, of the internal jugular and subclavian vein at each side; 10, the vena azygos; 12, the receptaculum chyli; 13, the thoracic duct, often dividing in the middle of the thorax into two branches, which soon reunite (the course of the duct behind the great vessels is shown by a dotted line); 14, the duct making its turn downward before terminating in the veins of the left side; 15, the termination of the trunk of the duct on the right side.—From Wilson's *Anatomist's Vade-mecum.*

THORBURN, *thor'bėrn*, GRANT: merchant: 1773, Feb. 18—1863, Jan. 21; b. near Edinburgh. Emigrating to America 1794, he was successively nail-maker and grocer in New York; and then seed-merchant, first in Newark, N. J., then in New York. He retired from business 1854. He contributed many articles to magazines and newspapers, under the name Lawrie Todd. He also published many books, among them: *Forty Years' Residence in America; Men and Manners in Great Britain; Lawrie Todd's Hints to Merchants. Married Men, and Bachelors.*

THOREAU, *thō'rō*, Henry David: author: 1817, July 12—1862, May 6; b. Middleboro, Mass. He graduated at Harvard 1837, and thereafter led a life mostly of eccentric solitude, writing for leading magazines, lecturing occasionally, engaged somewhat in civil engineering and handicrafts, intimate with a few exceptional men like Emerson and Alcott, and giving much time to communion with wild nature, of which he was a poetic student and an original interpreter, of the type of John Burroughs and a few others. To children and his own kin and intimates he was genial, but in general he cultivated stoicism. He was an extreme individualist, and even refused to recognize the right of society to tax him, for which, but more in resentment toward his ways and sentiments generally, he was for a while imprisoned. To carry out his amateur return to man's primitive condition, he built a hut in Concord, Mass., which, without lock, he regarded as no more his own than any natural retreat, but free to any finder. In philosophy he was a transcendentalist and a 'defiant pantheist.' His seclusion was more from nature-worship than a positively misanthropic temper, and his egoism verged naturally toward egotism. As a poet he was highly imaginative; as a scholar, a good Grecian; as a phenomenon, a wild olive-tree of New England independence and erraticism. In his lifetime he published *A Week on the Concord and Merrimac Rivers* (1849); and *Walden, or Life in the Woods* (1854). Afterward appeared *Excursions in Field and Forest* (1863); *The Maine Woods* (1864); *Cape Cod* (1865); *Letters to Various Persons*, with poems (1865); *A Yankee in Canada*, with reform papers (1866). See Sanborn's life of T. in *Amer. Men of Letters*.

THORITE, n. *thō'rīt* [after the Scand. deity *Thor*]: a hard, brittle, massive black mineral, occurring in the syenites of Norway. Thoria, n. *thō'rĭ-ă*, or Thorina, n. *thō-rī'nă*, one of the primitive earths obtained from the mineral thorite; oxide of thorium. Thorium, n. *thō'rĭ-ŭm*, or Thori'num, n. *-rī'nŭm* (symb. Th; at. wt. 234): very rare metal of the Tin group, white and very heavy, its sp. gravity being 9·402. Thorium was discovered 1828 by Berzelius in thorite, a mineral from the Norwegian island Lovön, in which it exists as a silicate: it has since been found in other rare minerals. It is not oxidized by water; dissolves easily in nitric, slowly in hydrochloric acid; and is not attacked by caustic alkalis. These compounds of T. have been obtained: Thorium oxide, ThO_2; T. chloride, $ThCl_4$; T. sulphate, $Th(SO_4)$. T. and its compounds have no practical importance.

THORN, n. *thawrn* [Icel. *thorn;* Goth. *thaurnus;* Ger. *dorn;* Dut. *doorn;* Dan. *tiörn*, a thorn]: any tree or shrub armed with sharp spines—specifically a hardy tree or shrub of the ord. *Rosācĕæ*, a common species in Britain being *Cratæ'gus ox'yacan'tha* or hawthorn (see Cratægus: Hawthorn); a Spine (q.v.); a prickle; anything that causes great trouble and anxiety; trouble; care; vexation. Thorn'y, a. *-ĭ*, full of thorns, or rough with them; spiny; troublesome and harassing. Thorn'less, a. *-lĕs*, wanting

thorns. THORN-BUSH, the hawthorn or other prickly shrub. THORN-HEDGE, a hedge or fence composed of thorn-bushes, particularly the hawthorn or *Crataegus oxyacantha*. THORN'BUT, *-bŭt* [Ger. *dornbutte*]: a turbot.

THORN, *torn* (Pol. *Torún*): strongly fortified town of Prussia, in the s. of the province of W. Prussia, on the right bank of the Vistula, 31 m. e.s.e. of Bromberg by railway. The town was founded 1232, was a member of the Hanseatic League, and contains many houses—e.g., the town-hall—remarkable for their beautiful gables and interiors. It is the birthplace of Copernicus, whose monument is in the *Johannis-Kirche*. It became a Polish town 1454. It came to Prussia after the second partition of Poland; was for a time under French authority; but became finally a part of the Prussian monarchy at the Congress of Vienna 1814. It became an important fortified stronghold in the 17th c., and has repeatedly been besieged. Since 1878 it has been made a fortress of the first rank by Prussia, the old fortifications being removed, and a series of detached forts built. There is active trade in corn and timber. Pop. (1880) 20,617, of whom two-fifths are German Protestants the remainder mainly Rom. Cath. Poles, with about 1,200 Jews : (1900) 29,626.

THE CONFERENCE OF THORN was an effort to explain away the differences between the Christian churches, with a view to religious reunion; and was originated by the king of Poland, Ladislas IV. Letters were addressed to all the religious bodies in Poland, inviting them to send delegates to an assembly at T., for mutual explanation of their doctrines, with a view to the removal of all differences of belief. The conference met 1645, Oct., and was opened in a spirit of moderation; but it soon lapsed into disputation and controversy, and broke up without any result 1645, Nov. 21.

THORN'-APPLE: plant of nat. order *Solanaceæ*, having a tubular 5-toothed calyx, a large funnel-shaped 5-lobed flower, a 2-laminated stigma, and an imperfectly 4-celled, prickly, or unarmed capsule. The species are in general very narcotic, and productive of excitement or delirium, and though eaten by goats, may be fatally poisonous, as when the fruit is eaten by children. The common T.-A., or STRAMONIUM, is known, in the far w. especially, as Jamestown or jimsen weed, and is common in waste places around towns. There are two species in N. Amer. (formerly regarded as one): *D. tatula*, the Purple S., referring to color of stem and flower, and supposed to be from tropical Amer.; and *D. stramonium*, with white flowers. It is an annual, with smooth stem and leaves and erect prickly capsules; native of the E. Indies; said to have been brought by the gypsies to Europe, where it is now abundant, as also in Asia, n. Africa, and N. America. It is by some stated to be the plant from which the poisonous 'dri' of the gypsies is obtained. It contains a peculiar narcotic alkaloid, *daturine*, which is one of the most powerful narcotic acrid poisons; but its leaves and seeds are used, though rarely, in medicine. The leaves have an extremely nauseous over-

powering smell and a loathsome bitter taste; the seeds, of dark-brown color, are still more poisonous. The leaves contain ·02 per cent. of the alkaloid. They are eaten by caterpillars; but a decoction produced convulsions in a rat, and drowsiness and even death in a horse. Average doses of 2 grains of the powdered leaves, or 1 grain of the root, repeated at intervals of several hours, are used to dilate the pupil of the human eye, or to strengthen the pulse and give warmth and moisture to the skin. Twice those amounts produce dizziness, nausea, feverishness, contusion of vision, and often an eruption like scarlatina. In fatal amounts, stupor combined with insomnia precedes death. The leaves, with great caution, have been smoked for spasmodic asthma; but this is inadvisable where there is pulmonary or cardiac weakness. The bruised leaves are an anodyne, externally applied, for rheumatism and neuralgia; but when these ills are deep-seated, the internal use of belladonna is more effectual. As an old remedy for insanity and epilepsy, it is obsolete, though benefit has been recorded in some isolated cases. It has been used also for whooping-cough, and dysuria, etc.—The alkaloid daturine (= daturia) has been regarded as identical with the atropine (see ATROPIA) from the plant *Atropa belladonna;* but Ladenburg, 1880, regards daturine as a mixture of atropine with much hyoscamine (alkaloid found in henbane, *Hyoscyamus niger*), while Ernst Schmidt, 1881, says the atropine predominates. Both substances have the same chemical formula, $C_{17}H_{23}NO_3$. Daturine, or stramonin, is a white tasteless powder, soluble in oils and ether, sparingly in alcohol. Atropine is more powerful in its effects than daturine, is soluble in alcohol, and its salts are insoluble in ether. The atropine sulphate, used in medicine, is most poisonous to carnivora, dogs somewhat excepted. A hypodermic $\frac{1}{20}$ of a grain raised the human pulse to 110; a 2-grain dose killed a man, and another man died from ointment of atropine on denuded skin. Infants are proportionately less affected, one recovering from a $\frac{3}{4}$-grain dose. Both daturine and atropine, in otherwise fatal amounts, are antidotes to poisoning by opium or its alkaloid morphia; and conversely these are used as antidotes to the former.

Still more narcotic is the Soft-haired Thorn-apple (*D. metel*), native of s. Asia and Africa. Robbers in India use it to stupefy those whom they would rob, or rather to throw them into the condition of a waking dream. From its seeds, with opium, hemp, and certain spices, a strong intoxicating substance is prepared, which the Mohammedans of India use to produce in themselves an indescribable pleasurable feeling for a short time; but this indulgence destroys the constitution. *D. sanguinea*, the FLORIPONDIO of Peru, is used by the Indians to prepare a very powerful narcotic drink, which stupefies when very diluted, and when strong brings on maniacal excitement.—The beautiful *D. fastuosa* has flowers externally of violet color and white within, and is cultivated as an ornamental plant, especially a variety with what are called double flowers but

which consist rather of two corollas, one within the other.—*D. arborea*, now known as *Brugmansia*, native of Peru and Colombia, is also cultivated: it has very splendid pendulous white flowers, 9–12 inches long, which diffuse a sweet odor in the evening and at night.

THORN'BACK (*Raia clavata*) : species of ray or skate, common on most parts of the British coast. It attains large size; the muzzle is little produced, and the form is nearly rhombic; the tail has two small membranous fins near the tip, on the upper central ridge, and a small dilatation at the tip. The upper surface is brown, with lighter spots; the under surface white. The upper surface is rough, with small points, and has numerous nail-like crooked spines, each with an oval bony base. This fish is esteemed for food, particularly in autumn and winter, but is most abundantly captured in spring and summer, when it approaches the shore to deposit its eggs.—The name T. is given also to a Brit. spider-crab (*Maia squinado*).

THORNDIKE, *thorn'dīk*, George Quincy: artist painter: about 1825–1886, Dec.; b. Boston. Having graduated at Harvard Coll. 1847, he studied painting in Paris, and on his return settled in Newport, R. I. He was strongly influenced by the 'French manner.' Of his works the best known are: *The Wayside Inn; Swans in Central Park; The Lily Pond.*

THORN'DIKE, Israel: merchant: 1757–1832, May 10; b. Beverly, Mass. He was appointed by the govt. of Mass. capt. of a privateer 1776, and took many prizes during the revolution. After the peace, T. engaged in the E. India and China trade and in manufacture, acquiring a large fortune. He was repeatedly member of the Mass. legislature. He purchased and presented to Harvard Coll. (1818) a very valuable library of 4,000 vols., largely of *Americana*.

THORN'TON, Sir Edward, G.C.B., D.C.L., LL.D.: born England, 1817, July 13. He entered the Brit. diplomatic service 1842 as attaché at Turin; was attaché at Mexico 1845, sec. of legation there 1851; sec. to the special envoy to the river Platte 1852; chargé d'affaires and consul-gen. to New Granada 1854, but was transferred in the same year to Uruguay; minister plenipotentiary to the Argentine Confederation 1859; special envoy and then minister plenipotentiary to Brazil 1865; transferred in the same capacity to Portugal 1867; but before assuming the duties of that post, T. was sent to Washington as Brit. minister. In 1871 he was one of the commission to arbitrate the Alabama Claims. He became ambassador to St. Petersburg 1881, and to Constantinople 1884, but was succeeded there by Sir William White 1886, since which time he has held no diplomatic position. He visited the United States 1887 as commissioner of foreign holders of bonds of the state of Va.

THORN'TON, JOHN WINGATE: historian: 1818, Aug. 12—1878, June 6; b. Saco, Me. He graduated at the Harvard Law-School 1840; was one of the founders of the New England Historic-Genealogical Soc., and vice-pres. of the Prince Publication Soc. and the American Statistical Assoc.; and contributor on antiquarian subjects to different periodicals. Among his works were the following volumes: *The Landing at Cape Anne; Ancient Pemaquid;* and *Pulpit of the American Revolution.* He died at Saco.

THORN'TON, MATTHEW: physician and patriot: 1714-1803, June 24; b. Ireland. He was brought to this country by his father 1717. He received a classical education at Worcester, Mass., and studied medicine; 1745, as surgeon, accompanied Pepperell's expedition against Louisburg; afterward settled at Londonderry, N. H., and practiced medicine; was made pres. of the provincial governing convention of N. H. 1775; was a delegate to the continental congress 1776, and signed the Declaration of Independence; subsequently became chief-justice of Hillsborough co., N. H., and afterward judge of the supreme court. He died at Newburyport, Mass.

THORNWELL, *thorn'wĕl*, JAMES HENLEY, D.D., LL.D.: Presbyterian clergyman and educator: 1812–1862, Aug. 1; b. in Marlborough district, S. C. After graduation at the S. C. Coll. 1829, and studying law, he turned to theol.; preached at Waxhaw, and 1836 became prof. of logic and belles-lettres in S. C. Coll.; in 1842 prof. of the evidences of Christianity, and in 1852 president. Four years later he resigned for a professorship in the Presb. theol. seminary at Columbia, which he retained until the year of his death. His philosophical and logical mind, literary finish, and ability in speech, together with his zeal for high orthodoxy and for southern institutions and claims, rendered him very prominent. Besides pamphlets, he published *Arguments of Romanists Discussed and Refuted* (1845); *Discourses on Truth* (1854); *Rights and Duties of Masters* (1861); *The State of the Country* (1861). A collection of his works by Rev. John B. Adger was issued in 2 vols. 1874. He died in Charlotte, N. C.

THORNYCROFT, *thorn'ĭ-kroft*, MARY (FRANCIS): English sculptress: b. Thornham, Norfolk, 1814; d. London, 1895; dau. of John Francis, sculptor. In her early youth her work found place in the Royal Acad. exhibition. Among her first original pieces was a *Penelope; Ulysses and His Dog;* and an admirable *Flower Girl.* She was married 1840 to one of her father's pupils, T. Thornycroft, and soon afterward spent some time in Rome, modelling a *Sappho* and other designs. In 1843 Queen Victoria commissioned her to make statue portraits of the Princess Alice, the Princess Royal, the Prince of Wales, and Prince Alfred, the four in the character of the seasons. Her later work was in the same line, for the most part, including persons of rank or otherwise distinguished.

THORNYCROFT, William Hamo: English sculptor: b. London 1850, Mar. 9. He received his education at University College School, London, and entered the Royal Academy schools in 1869. He first exhibited at the academy in 1871, and in the same year went to Italy. He gained a gold medal from the Academy in 1875 for a group representing *A Warrior Bearing a Wounded Youth from the Field of Battle,* and in 1880 he completed his *Artemis* for the Duke of Westminster. He became R.A. in 1888. He was made an honorary member of the Royal Academy of Munich in 1889, and he received a *médaille d'honneur* at the Paris Exhibition of 1900. His principal works include, in addition to those mentioned: *Teucer* (1881); now in the Tate Gallery; *The Mower* (1884); a memorial of the poet Gray (1885) at Pembroke College, Cambridge; a bust of S. T. Coleridge (1885); in Westminster Abbey; *The Sower* (1886); a memorial of Sir John Goss in the crypt of St. Paul's Cathedral; the National Memorial to General Gordon in Trafalgar Square, London; *Medea* (1888); a statue of John Bright (1890) in Rochdale; *The Mirror* (1890), his diploma work; *Summer* (1893); *The Joy of Life* (1896); a monument of W. O. Stanley at Holyhead (1897); *The Bather* (1898); *Lot's Wife;* and many monumental statues, including those of Queen Victoria, Archbishop Thomson (York Minster), and W. E. Gladstone (1902). The style of this sculptor shows a return from pictorial realism toward the severity of Greek idealism. His woman forms are characterized rather by strength and grandeur than the meretricious prettiness of the fleshly school. His monumental statues, the best of which is that of Gordon, are some of the noblest in English art, and his heroic figures, such as *Teucer,* are instinct with life, while exhibiting something of the purity of line and classic grace which belong to the Periclean age of sculpture.

THORODDSEN, *thôr'ōd-sĕn,* Thorvald: Icelandic physicist: b. Flatey, Breidifjord, West Iceland, 1855, June 6. He was educated at the College of Reykjavik and the University of Copenhagen, and was a teacher at the first named institution 1885-95. Since the last named date he has resided in Copenhagen, spending his summers in Iceland, and has made a geological survey of the entire island. Among his publications are: *History of Icelandic Geography* (1892-1902); *Geological Map of Iceland* (1901); *Earthquakes in Iceland* (1899); *History of Icelandic Volcanoes* (1882).

THOROGUM'MITE: a rare mineral found only in Llano co., Texas. It is essentially a hydrated thorosilicate of uranium, containing also ceria, yttria, lead, etc. It is regarded as made up of three molecules of thorite, linked with one of uranic oxide. It is highly valuable as an ore of uranium and thorium. It occurs massive or in crude crystals resembling thorite in form. Its color is dull yellowish-brown; hardness, 4 to 4.5; specific gravity, 4.43 to 4.54.

THOROLD, *thōr'old*, ANTHONY WILSON, D.D.: Anglican bishop: b. Hougham, Eng., 1825, June 13; d. Surrey, Eng., 1895, July 2. He was educated at Oxford. Having received priestly orders, he was successively rector of several parishes in London; canon of York 1874; bp. of Rochester 1877; and was transferred to the see of Winchester 1891. He wrote many devotional works, including *The Presence of Christ;* and *Questions of Faith.*

THOROUGH, a. *thŭr'ō* [AS. *thurh;* OHG. *druh*, thorough another form of THROUGH, which see]: *literally*, passing through or to the end—hence, complete in every respect; perfect; entire: PREP. in *OE.*, through: N. in *Eng. hist.*, the name given by Wentworth, Earl of Strafford, in his correspondence, to the policy which he meditated of rendering Charles I. an absolute monarch; in *prov. Eng.*, a furrow between two ridges. THOR'OUGHLY, ad. *-lĭ*, fully; completely. THOR'OUGHNESS, n. *-nĕs*, the state or quality of being thorough. THOROUGH-BRED, a bred from a sire and a dam of the best blood, as a horse; fully taught or accomplished. THOROUGH-BASS, or -BASE, *-bās*, in *music*, an accompaniment to a continued bass by figures; a term commonly used as synonymous with the science of harmony (see FIGURED BASS, under FIGURE). THOR'OUGHFARE, n. *-fär*, a passage from one street or opening to another; an unobstructed way; power of passing. THOROUGH-GOING, a. going all lengths; thorough; complete; out-and-out. THOROUGH-PACED, a. well-trained, as a horse; complete; going all lengths; out-and-out; consummate, as a *thorough-paced* scoundrel. THOROUGH-PIN, a tumor on each side of the hock of a horse.

THOR'OUGHWORT: see EUPATORIUM.

THORP, or THORPE, n. *thŏrp* [AS. *thorp*]: in *OE.*, a hamlet; a common element of place names, as Miln *thorpe*.

THORPE, FRANCIS NEWTON, American author: b. Swampscott, Mass., 1857, April 16. He was educated at Syracuse University and at the University of Pennsylvania Law School, and has published: *The Government of the People of the United States* (1889); *Franklin and the University of Pennsylvania* (1893); *The Government of the State of Pennsylvania* (1894); *A (Social and Industrial) History of the American People* (1901); *The Spoils of Empire* (1903); *A Short Constitutional History of the United States* (1904); *The Divining Rod* (1905); etc.

THORPE, THOMAS BANGS: author and artist painter: 1815, Mar. 1—1878, Oct.; b. Westfield, Mass. Having studied 3 years in Wesleyan Univ., he made a tour of the south, and settled in La. His first venture in authorship was *Tom Owen the Bee-hunter*, which won for him high rank among humorists. This was followed by *The Big Bear of Arkansas*, equally successful. He became editor of the New York *Spirit of the Times* 1859.

THORVALDSEN, *tor'vâl-zĕn*, BERTEL: one of the greatest of modern sculptors: 1770, Nov. 19—1844, Mar. 24; b. Copenhagen, Denmark. The date and place of his birth (as above) are not absolutely certain; and he himself, when casually questioned as to the day, replied with *brusque* felicity: 'I don't know; but I arrived at Rome on the 8th March, 1797;' dating his birth, as it were, from the commencement of his career as an artist. He was the son of a poor ship-carpenter from Iceland, who had settled in Copenhagen; and his first essays in art were the carving of figure-heads in the yard where his father worked. His education was otherwise neglected, so that through life he could but indifferently write or spell; but the genius for art was born with him, and 1793 he gained the first gold medal for design at the Acad. of Copenhagen; and with it the privilege of three years' residence abroad for study. Accordingly, 1796, he sailed for Rome. After obscure and patient labor, he at length drew admiration by the model for his great work *Jason*. No purchaser, however, appeared for it till 1803, when the nearly discouraged sculptor received an order for its production in marble at a munificent price. From this time prosperity and fame flowed upon him. In 1819 he returned to Denmark for a year: his reception in Copenhagen was triumphal, and apartments were assigned him in the palace of Charlottenburg. He was again in his native land 1838–41. In 1844, revisiting Copenhagen, he died suddenly there in the theatre, of disease of the heart. All the works remaining in his possession he bequeathed to his country, to be preserved in a museum bearing his name, for whose maintenance he left also the bulk of his fortune, reserving a sufficient provision for Madame Poulsen, his natural daughter. This magnificent and unique collection is now one of the glories of the Danish metropolis. By his countrymen he is ranked as the greatest of sculptors since Michael Angelo: this verdict has been generally acquiesced in elsewhere; though the reaction in recent years against the classic style in sculpture, which mostly he imitated, has reduced his popularity. No catalogue of his chief works can here be given. He addicted himself by preference to classical and mythological subjects; but his great works in the cathedral of Copenhagen, *Christ and the Twelve Apostles*, *St. John preaching in the Wilderness*, and the *Procession to Golgotha*, have been much admired. Of his busts of eminent contemporaries, those of Byron and the great Danish poet Œhlenschläger are most notable.—The life of T. has been written by Hans Christian Andersen, by J. M. Thiele, and by Eugene Plon. English readers may consult a careful abridgment of Thiele's work by the Rev. M. R. Barnard (London 1865); and a translation of Plon's *Life* by Mrs. Cashel Hoey (1874).

THOSE, a. *thōz* [AS. *thâs*]: the plu. of THAT (q.v.); *those* refers to the former, *these* to the latter.

THOTH, n. *thŏth:* the anc. Egyptian god of eloquence, mythical inventor of writing and philosophy, and of music: the name means 'speech' or 'word:' the Egyptian Mercury or Hermes (q.v.: also EGYPT).

Thoth.—From a Bronze in the British Museum.

THOU, pron. *thow* [AS. and Icel. *thú;* Goth. *thu;* Dan., Sw., and Ger. *du;* L. *tu;* Gr. *su* or *tu;* Skr. *tvam*, thou]: nom. sing. of the second personal pronoun, formerly used in general address, but now seldom used, except in solemn discourse, in addressing the Deity, and by the Society of Friends or Quakers in their ordinary conversation, in *OE.*, *thou* was used in expressing affection toward intimate friends, contempt or reproach, and also good-humored familiarity between master and servant. THOU, v. to address as 'thou,' implying, scorn contempt, or the like.

THOU, *tō*, JACQUES AUGUSTE, DE, or, as his name is frequently written, JACOBUS AUGUSTUS THUANUS: 1553, Oct. 8—1617, May 7; b. Paris; son of Christophe de T., first pres. of the Parlément de Paris. He was intended for the priesthood, and took minor orders; but soon renounced the clerical profession and turned to jurisprudence, diplomacy, and historical study—making his residence at Valence in Dauphiné, where he made the acquaintance of Scaliger, with whom he maintained friendship through life. In 1578 he accepted, with reluctance, the office of ecclesiastical councilor of the Parlément of Paris. A firm adherent of royalty, in 1588 he was made councilor of state to Henry III.; and became prominent in public affairs. On the accession of Henry IV., he was made keeper of the royal library. In 1593 he began his great work, *Historia sui Temporis.* He took an important part in the arrangement of the Edict of Nantes; but thenceforward seems to have had little connection with public affairs. From 1604, when the first 18 books of the history appeared, T. held the position of first historian of his age. Eighty books appeared during his life; and the remainder, in all 138 books, were pub. 1620.

As a historian, T. is eminently impartial; so devoid, indeed, of religious prejudice, that he incurred the imputation of a criminal Prot. sympathy; and 1609 his work was put into the *Index Expurgatorius.* It is written in severely classical Latin. The best Eng. ed. is by Samuel Buckly, 7 vols. 1733. T. wrote also a number of Latin poems.—See *Autobiography,* ending 1601; also Collinson, *Life of Thuanus* (Lond. 1807).

THOUGH, conj. *thō* [AS. *theah;* Icel. *tho;* Goth. *thauh*, though]: granting or admitting, as, '*though* he slay me, yet will I trust in him;' notwithstanding; even if. AS THOUGH,

as if. *Note* —In familiar language, *though* is used as an adverb at the end of a sentence in the sense of *however, yet,* and is meant to render emphatic and affirmative the statement or opinion of the speaker—that, in spite of drawbacks, such 'was or would be'—as, 'his division was successful *though.*'

THOUGHT, *v. thawt:* pt. and pp. of THINK (q.v.).

THOUGHT, n. *thawt* [AS. *theaht* or *thoht,* thought—from *thencan,* to think: Icel. *thotti,* thought (see THINK)]: that which the mind thinks; the act of thinking; the state of the mind when attending to a particular subject; inward reasoning; an idea; a conception; fancy; imagination; meditation; judgment; solicitude; design or purpose; in *familiar language,* small quantity, slight degree, as, 'I am a *thought* better.' THOUGHT'FUL, a. *-fûl,* full of thought; having the mind directed to some object; anxious; attentive; considerate. THOUGHT'FULLY, ad. *-li.* THOUGHT'FULNESS, n. *-nĕs,* deep meditation; solicitude. THOUGHT'LESS, a. *-lĕs,* without thought; careless; airy; gay; negligent; stupid; dull. THOUGHT'LESSLY, ad. *-li.* THOUGHT'LESSNESS, n. *-nĕs,* the state or quality of being thoughtless; heedlessness; inattention. THOUGHT-SICK, n. *-sĭk,* in *OE.,* uneasy with reflection. SECOND THOUGHTS, closer consideration; calmer reflection.—SYN. of 'thought': idea; sentiment; fancy; conceit; reflection; conception; opinion; judgment; design; meditation; purpose; solicitude; care; concern; expectation; attention; anxiety; imagination; notion; supposition; consideration; contemplation; circumspection.

THOUROUT, *tô-rôt':* town of Belgium, province of w. Flanders, 11 m. w.s.w. of Bruges. There are manufactures of starch, mustard, hats, and wooden shoes. T. was a place of great commercial importance in the middle ages. Pop. (1880) more than 8,000; (1890) 9,464.

THOUSAND, n. *thow'zănd* [Goth. *thusundi;* Icel. *thúsund;* Dan. *tusind;* Sw. *tusen;* Lith. *tukstantis,* a thousand]: the number ten hundred; any great number: ADJ. denoting ten hundred, or any great number. THOUSAND FOLD, a. multiplied by a thousand. THOU'SANDTH, n. *-zăndth,* the ten hundredth part of anything: ADJ. denoting one part of a thousand equal parts; next after the nine hundred and ninety-ninth; the ordinal of thousand.

THOUSAND AND ONE NIGHTS: see ARABIAN NIGHTS' ENTERTAINMENTS.

THOUSAND ISLES: small islands, numbering 1,500 to 1,800, in the St. Lawrence river; extending about 40 m. from the emerging of the river from Lake Ontario toward its mouth. They are partly in Ontario, Can., and partly in Jefferson and St. Lawrence cos., N. Y. From the picturesque river scenery of these islands with the numerous channels that wind among them, many of them have become summer homes for residents of cities, and the whole group is a favorite summer resort for tourists and pleasure-seekers.

THOWEL, or THOWL: see THOLE 1.

THRACE, *thrās*, or *thrā'sē:* anciently an extensive region bounded n. by the Danube, e. by the Euxine, s. by the Ægean and Macedonia, w. by Macedonia and Illyria. In prehistorical times, however, the name appears to have denoted the whole of e. Europe n. of Greece, including Macedonia and Scythia; at least this is the inference from the fable that Oceanus had four daughters—Asia, Libya, Europa, and Thracia. It is, on the whole, very mountainous—whence, perhaps, its name T., from *tracheia*, rugged (?)—the principal range being Hæmus (mod. *Balkan*, q.v.), from which three lesser chains branch s.e., the loftiest being Rhodope, whose summits rise above 8,000 ft. The three most important rivers are the Strymon (mod. *Struma*), which, during the Greek period, formed the boundary between it and Macedonia; the Nestus (mod. *Carasu*); and the Hebrus (mod. *Maritza*, q.v.), the largest—all flowing s. from Hæmus into the Ægean Sea. Roughly speaking, ancient T., before the rise of the Macedonian power, comprised the territory now divided by the Turks into the provinces of Rumili and Bulgaria; but subsequently the Romans made the range of Hæmus the n. limit of T., and gave the region between Hæmus and the Danube the name of Mœsia (mod. *Bulgaria*). The climate was considered by the Greeks very severe—even that of Ænos, on the shores of the Ægean, being described by Athenæus as 'eight months of cold and four months of winter;' but it is believed that the ancient accounts are much exaggerated or are only poetically applied to T. as *the North*, though it is not to be denied that, in the mountainous districts, the frost was, and is, often intense. The country was marshy, undrained, and overspread with dense damp forests (of fir, oak, chestnut, etc.), which must have lowered the temperature; but large portions, especially in the s. and e., 'such as the great plain of Adrianople and the land toward the lower course of the rivers Nestus and Hebrus,' were very fertile. The chief products were corn, millet, wine, and hemp. Cattle, sheep, horses, and swine were reared in great numbers. The region between the Nestus and the Strymon appears to have been infested by lions. Herodotus states that they attacked the baggage-camels of Xerxes on his march; but these animals have certainly long since disappeared. Gold and silver mines were numerous and productive in the same locality, and acquisition of these was a principal motive for Philip of Macedon's aggressions.

The question, much discussed, as to what race the Thracians belonged, is not yet settled. It is certain, however, that two different peoples went by this name in early times. It is repeatedly asserted by those writers who treat of the confused medley of tradition and myth which fills up the prehistoric annals of Greece, that a race of 'Thracians' inhabited part of the Hellenic peninsula, and had at one time extended as far as Attica. To these prehistoric Thracians belonged, says Strabo, the Muses, and the cultivators of ancient music, Orpheus, Musæus,

Thamyris, and Eumolpus; and the grand argument against confounding them with the Thracians of history, is the impossibility of a race so notoriously barbarous as the latter in language and manners, having sprung from the authors of Hellenic literature and art (see Müller's *Hist. of Greek Lit.*, p. 26 *et seq.*). But whether the prehistoric Thracians were properly Hellenes, or 'Pelasgians'—whatever *that* may mean—is indeterminable.

Passing now to the historic Thracians, whom we find settled in the regions n. and e. of Macedonia, we are again at fault. Of their manners and customs, of their character, and their later history, we know something; but of their origin and ethnological relations, scarcely anything. They were not Greeks, for they spoke a language which the latter called barbarous; but if (as Strabo asserts) the Getæ and Daci were branches of the Thracian family, and spoke the same tongue, we may conjecture that, ethnologically ,the term 'Thracians' denotes a mixed Illyrico-Scythian race; though it is impossible, from lack of evidence, to substantiate the conjecture. Herodotus, Xenophon, and Strabo are our chief authorities regarding the habits and practices of the people. From them we learn that they bought their wives, and sold their children. Polygamy was general, and when a husband died his favorite spouse was slain over his grave. Before marriage the Thracian women had the utmost liberty; after it, they were guarded with Turkish rigor. War and robbery were the only honorable occupations of the men. They lived to steal, either from each other or from neighboring peoples. When not fighting or plundering, they spent their days in savage idleness, or in quarrelling over their cups. Courageous, or rather ferocious, after the fashion of barbarous peoples, they lacked the steady valor and endurance of disciplined troops; at all times their warfare displayed more fierceness and impetuosity than fortitude. Their treachery was probably no greater than that of other barbarians.

The history of T. may be sketched in few words. The Greeks became acquainted with the inhabitants first when they began to plant Grecian colonies on the coasts. Of these, the principal were Byzantium (B.C. 675), Selymbria, Abdera (B.C. 560), Mesembria, Dicæa, Maronea Ænus, Cardia, Sestus, Amphipolis, etc.; but their lack of union—the fatal weakness of Hellenic civilization—hindered them from acquiring firm power, and enabled the Thracian chiefs of the interior to preserve their independence. Darius, King of Persia, marched through T. (B.C. 513) on his way to punish the European Scythians; and on his return left Megabazus, with 80,000 men, to subdue the country. In this he partially succeeded, but new disturbances and complications arose between the Persians and Greeks, which resulted (B.C. 480) in the famous expedition of Xerxes, whose details do not belong to Thracian history. A consequence of the expulsion of the Persians from Europe was the resumption of liberty and the revival of prosperity among the Greek colonies in Thrace. Shortly

before the Peloponnesian War, a native Thracian state—the Odrysian—had attained great power and eminence under a ruler named Sitalces, who joined the Athenian alliance, but could not, with all his resources, prevent the triumph of Sparta in the north as well as in the south. The rise of the Macedonian kingdom, under Philip II. (B.C. 359), destroyed the independence of great part of T.: all the region between the Strymon and Nestus was incorporated with Macedonia, and Macedonian garrisons were established further east. Under the govt. of Lysimachus, the subjugation of T. became complete. On the fall of the Macedonian kingdom (B.C. 168), T. passed into the hands of the Romans, and subsequently shared the vicissitudes of the Roman empire. In A D. 334, a colony of Sarmatians was planted in T. by Constantine, and 376 another of Goths by permission of Valens. In 395 it was overrun by Alaric, and 447 by Attila. In 1353 Amurath obtained possession of all its fortresses, except Constantinople, and it has since remained subject to Turkey.—See BULGARIA: ROUMELIA, EASTERN.

THRALE, Mrs. HENRY: see PIOZZI, HESTER LYNCH (SALUSBURY) [THRALE].

THRALL, v. *thrawl* [Icel. *thræll;* Sw. *träl;* Dan. *træl;* OHG. *trigil*, a slave]: in *OE.*, to enthrall; to enslave: N. a slave; a serf; a bondman; slavery; bondage. THRALL'ING, imp. THRALLED, pp. *thrawld.* THRAL'DOM, n. *-dŏm*, bondage; slavery; the state of a thrall or serf; servitude.

THRANG, a. *thrăng* [see THRONG]: in *Scot.*, crowded; busy; intimate; familiar; thick.

THRAP, v. *thrăp:* in *prov. Eng.* and *OE.*, to crowd; to wrap or bind on. THRAP'PING, imp. THRAPPED, pp. *thrăpt.*

THRAPPLE, n. *thrăp'pl* [AS. *throt-bolla*, the throat-pipe]: in *Scot.*, the windpipe of an animal: V. to seize forcibly by the throat; strangle; choke. THRAP'PLING, imp. *-plĭng.* THRAP'PLED, pp. *-pld.* Also spelled THROPPLE.

THRASH, v. *thrăsh* [see THRESH]: to beat, as with a flail (see THRESH); to beat soundly; drub. THRASH'ING, imp.: N. a sound drubbing. THRASHED, pp. *thrăsht.* THRASH'ER, n. *-ẽr*, one who thrashes (see THRESHER). THRASHING-MACHINE, a threshing-machine (see THRESHING).

THRASH'ER, corruption of *Thresher:* name applied to a family of sharks (*Alopiidæ*). tail as long as the body, and eye with no nictitating membrane; one species only is known (*Alopias vulpes*), sometimes called Fox shark or Swingle-tail; it is 20 ft. long, and occasional near our Atlantic coast.—The term in its corrupt form is given also to some birds of the Thrush family (*Turdidæ*), now oddly placed by the American Ornithological Union with the wrens (*Troglodytidæ*); such as the T. or Brown T. (*Harporhynchus rufus*) of the e. United States, familiar as a reddish-brown bird, about 11 in. long, with spotted breast; it is a fine singer.

THRA'SIMENE, Lake. See Trasimenus Lacus.

THRASONICAL, a. *thrā-sŏn'ĭ-kăl* [from *Thraso*, a military braggart in Terence's *Eunuchus*—from Gr. *thrasus*, bold]: vainglorious; boastful.

THRASYBULUS, *thrăs-ĭ-bū'lŭs:* Athenian general and democratic leader: d. about 390 B.C. He was a friend of Alcibiades, whose recall from exile he obtained. In 411 B.C. he commanded a galley in the fleet at Samos, joined in the opposition to the oligarchy of the Four Hundred, and exacted an oath from the Athenians in the fleet to uphold democratic government. At the battle of Cynossema he commanded the right wing, and secured the victory by a sudden attack upon the Peloponnesians. In 407 B.C., with a fleet of 30 ships, he reduced most of the revolted cities on the coast of Thrace to submission, and about the same time was with Alcibiades elected one of the new generals. Banished on the establishment of the Thirty Tyrants, he seized, with the aid of some Thebans, the fortress of Phyle, and with an increased force occupied the Piræus. After the accession of the Ten he was defeated by Lysander and Libys, but, together with all who had joined him, was saved from punishment by the contrivance of Pausanias. In 395 B.C. he led an army to the assistance of the Thebans, then menaced by Sparta, and five years later was sent with 40 ships to aid the Rhodians against Teleutias, restored the Athenian interest in Byzantium, secured several new alliances, and reduced Methymna and other towns in Lesbos. Afterward sailing s., he anchored in the Eurymedon, near Aspendus in Pamphylia, when the inhabitants, exasperated by some act of his soldiers, fell upon him in the night and killed him.

THRAVE, n. *thrāv* [Dan. *trave*, a score of sheaves: Icel. *threfi*, twelve sheaves: Sw. *trafwe*, a pile of wood: Icel. *thrifa*, to gripe—*lit.*, a handful]: in *OE.* and *Scot.*, two dozen; twenty four sheaves of wheat; two stooks of grain; also Threave (q.v.).

THREAD, n. *thrĕd* [Dut. *draad;* Icel. *thradr;* Dan. *traad;* Ger. *draht*, thread—from Ger. *drehen;* Dut. *draaijen*, to turn, to twist]: a thin twisted filament or cord of fibrous substance; specifically, a fine cord consisting of two or more filaments or yarns twisted together, used in some kinds of weaving, but more particularly for sewing, as cotton, linen, or silk *thread;* any fine filament or line; the prominent spiral part of a screw; something continued, as the *thread* of a discourse: V. to pass a thread through, as the eye of a needle; to pass or pierce through, as a narrow or intricate way. Thread'ing, imp. Thread'ed, pp. Thread'en, a. *-n*, in *OE.*, made of thread. Thread'y, a. *-ĭ*, like thread; containing thread or threads. Thread'iness, n. *-nĕs.* the state of being thread-like, or drawn out into threads. Thread'er, n. *-ĕr.* one who

threads. THREAD-BARE, a. worn to the threads, or deprived of the nap, as cloth; worn out; used till it has lost its interest or novelty; hackneyed; trite. THREAD'BARENESS, n. the state of being threadbare or hackneyed. THREAD-SHAPED, a. in *bot.*, in the form of a filament or thread.

THREAD'NEEDLE STREET: London, England, the short thoroughfare faced by the Bank of England, which is proverbially called 'The Old Lady of Threadneedle Street.' The name is supposed to be derived from the three needles on the coat-of-arms of the Needlemakers' Guild.

THREAD'WORM: one of the thread-shaped nematode intestinal worms annoying to all the higher animals, as *Ascaris,* or *Oxyuris,* which often infests the lower bowel in childhood. See ROUNDWORMS.

THREAP, or THREEP, v. *thrēp* [AS. *threapian,* to reprove]: in *Scot.* and *OE.,* to urge or aver with pertinacity; to argue; to contend; insist. THREAP'ING, imp. THREAPED, pp. *thrēpt.*

THREAT, n. *thrĕt* [AS. *threat,* a crowd of people, a threat; *threan,* to reprove: Icel. *thræta,* to threat: Goth. *thriutan,* to vex greatly]: an avowed determination to inflict punishment or injury on another; a menace: V. to threaten. THREATEN, v. *thrĕt'n,* to announce a purpose of inflicting punishment or injury on; to attempt to terrify by threats or menaces; to present the appearance of coming evil; to exhibit the appearance of some coming danger or evil. THREATENING, imp. *thrĕt'nĭng:* ADJ. indicating a menace or some evil or danger impending: N. the declaration of a purpose to inflict evil; a denunciation of evil; a menace. THREATENED, pp. *thrĕt'nd.* THREATENER, n. *thrĕt'nĕr,* one who threatens. THREAT'ENINGLY, ad. *-lĭ.* THREATENING LETTERS, letters containing threats of violence, or injury to person, reputation, or the like, sent to one in order to extort money, or coerce into some particular course of action—an offense punishable with imprisonment or penal servitude (see THREATS).

THREATS, in Law: that kind of intimidation whose object is to cause a person to abandon or surrender some legal right, or what is equivalent, to pay money, to prevent some injury being done to him. When the threats are made by more than two persons, the offense usually assumes the form of Conspiracy (q.v.). In other cases, the usual form of the offense is the sending of a threatening letter—anonymous or otherwise—demanding money from the party addressed; otherwise, that he will be murdered, or his house will be burned, or he will be charged with some infamous crime. The sending, bearing, etc., of such a letter is in all the states of the Union an indictable offense; but in some of the states the threat must have been made 'maliciously,' in others 'knowingly,' to make it indictable.

THREAVE, n. *thrēv* [same as THRAVE (q.v.)]: in *OE.*, a drove; a throng; a crowd; a heap; in *Scot.*, twenty-four sheaves of corn, comprising two shocks or stooks; a considerable number.

THREE, n. a. *thrē* [Dut. *drie;* Dan. *tre;* Goth. *threis;* Lith. *trys;* L. *tres;* Gr. *treis;* Skr. *tri,* three]: two and one. THREE-DEEP, a. in rows of three running across the length. THREEFOLD, a. thrice repeated. THREE-COAT-WORK, a plastering consisting of picking-up, roughing-in, floating, and finishing. THREE-PHASE SYSTEM, an alternating-current system employing three alternating currents, of equal strength, differing in phase by 120°, or one-third of a cycle. THREE-PILE, an old name for velvet of a good quality. THREE-PILED, a. *-pīld,* in *OE.*, covered with a good thick pile, as velvet; having a triple pile or nap; heaped one upon another. THREE-PLY, a. of three thicknesses; consisting of three webs inwrought together in weaving; threefold. THREE-SCORE, three times twenty; sixty. THREE-WAY COCK, a cock having three branches, and by which the fluid from the inlet branch may be diverted into the other two at will. THREE-WIRE SYSTEM, in electric distribution, the system which provides three main conductors, the middle one of which is neutral, or midway in potential between the other two.

THREE-COLOR PROCESS, THE: and the 'tri-chromatic process,' are the names given to an indirect process of color photography which has been successfully developed in various applications, but not in any way with sufficient simplicity of operation to make it commercially practicable except for special purposes. The first suggestion of such a process was made by Prof. James Clerk-Maxwell, in 1861 or before, and the principle was reinvented and elaborated by Louis Ducos Duhauron and Charles Cros in 1869, but the results obtained experimentally were unpromising, and owing probably to this fact and also to the existence of a general prejudice against the idea of color photography by any but a 'direct' process, the subject received but little further attention until F. E. Ives, in 1888, stated a new and definite principle of photographic color selection, and gave a successful public demonstration at the Franklin Institute, in Philadelphia. This was followed by a great revival of interest and active experiment, and the commercial development of the process in various applications. The first step in this process is the production of three photographic negatives which constitute a record of the color values in terms of spectrum red, green and blue-violet lights, these being the only spectrum colors which will by admixture in various proportions reproduce all other colors without material degradation of purity. Such sets of negatives are made by exposing color-sensitive photographic plates in the camera through selective 'color screen.'

The negative made through a red screen must print a positive uncolored in its high lights and peacock-blue in its shades. The negative made through a green screen must print a positive uncolored in its high lights and crimson-pink in its shades. The negative made through a blue screen must print a positive uncolored in its high lights and yellow in its shades. It is also important that these colors be perfectly transparent. When these prints are superposed, equal parts of all three colors form blacks and grays, and the pure colors, red, green and blue-violet appear where yellow is superposed on crimson-pink, peacock-blue on yellow, and crimson-pink on peacock-blue.

The first half-tone trichromatic process prints were made by Ives in 1881, but the process was not developed commercially until re-invented and patented by Albert, Duhauron and Kurtz, more than 10 years after. In this process, half-tone blocks are made from the three negatives, and printed in the type press, with the peacock-blue, crimson-pink and yellow inks. In order to prevent the production of an offensive moiré pattern, the lines of the half-tone blocks are disposed at different and suitable angles for the different colors. Owing to the complications of the process, and the theoretical imperfections of materials and means necessarily employed in its commercial operation, the printing plates are more or less re-etched in parts until proofs show the desired result, but with so little work and cost altogether that the process is competing successfully with chromolithography for many purposes, and may eventually supersede it, as half-tone engraving has already superseded wood engraving.

THREE HOURS' AGONY, or THREE HOURS' SERVICE: in *eccles.* and *chh. hist.*, a devotion in commemoration of Christ's passion on the cross, practiced on Good Friday, from noon till three o'clock. It was introduced into the English Church about 1865.

THREE KINGS, FEAST OF THE: famous mediæval festival, identical with Epiphany (q.v.) or Twelfth Night, and designed to commemorate the visit of the three magi or wise men of the East (transformed by the mingled ignorance and reverence of the middle ages into great kings) to the infant Saviour (see MAGI). But the name is given especially to a kind of dramatic or spectacular representation of the incidents recorded in Matt. ii., e.g., the appearance of the wise men in splendid pomp at the court of Herod, the miraculous star, the manger at Bethlehem, the solemn and costly worship of the Babe—which was long very popular. In 1336 a peculiarly gorgeous representation was given at Milan by the Preaching Friars. See Chambers's *Book of Days,* I. 62.

THREE-MILE LIMIT. See INTERNATIONAL LAW.

THREE RIVERS, Canada: city, port of entry and county-seat of St. Maurice co., Quebec; on the n. bank

of the St. Lawrence river at its junction with the St. Maurice, 90 m. below Montreal, 66 m. above Quebec; and on the Canadian Pacific, and connected by ferry with the Grand Trunk railway. It has a large export trade in lumber and wood-pulp, the Shawanegan and other falls of the St. Maurice being extensively utilized as water power for these industries; a large iron works, and important manufactures of foundry products and machinery; and other manufactures. The Roman Catholic cathedral is an imposing structure; other handsome buildings are the bishop's palace, the college, and several convents, schools and churches. The city is lighted by gas and electric lights and has hotels, banks, and semi-weekly and weekly newspapers. Three Rivers was founded by Champlain in 1634. Pop. (1901) 9,981.

THREMMATOLOGY: a term proposed by Ray Lancaster (from the Greek *thremma,* a nursling) to cover the principles and practices connected with the improvement of domesticated animals and plants. It is distinct from evolution in general in that its ultimate purpose is utilitarian. The breeder is interested in definite results, whereas nature is supposed to be indifferent to everything but the 'survival of the fittest.' The purpose then in thremmatology is not to make the creature 'fit' the conditions of life, but rather to bring both the creature and conditions to harmonize with the highest needs and purposes of man.

THRENE, n. *thrēn* [Gr. *thrēnos,* a wailing—from *threomai,* I cry aloud]: in *OE.,* a lamentation; a complaint. THRENETIC, a. *thrē-nĕt'ĭk,* or THRENET'ICAL, a. *-ĭ-kăl* [Gr. *thrēnētikos,* inclined to mourning]: sorrowful; mournful. THRENODY, n. *thrĕn'ō-dĭ* [Gr. *ōdē,* a song]: a song of lamentation.

THRESH, v. *thrĕsh,* or THRASH, v. *thrăsh* [imitative of the sound: ME. *threshen;* Icel. *threskja;* Dan. *tærske;* Ger. *dreschen;* Goth. *thriskan,* to thresh]: to beat, as with a flail, in order to separate the grain or seed from the straw (see THRESH'ING, below); to beat soundly; drub. THRESH'ER, n. *-ėr,* one who threshes grain from the straw; a threshing machine; the sea-fox, a kind of shark (see FOX SHARK). THRESHING, imp.: N. the separation of the grain or seeds of plants from the straw or haulm by some beating action (see below). THRESHING-FLOOR, the floor or level spot on which grain is beaten out, as by the flail, the treading of oxen, etc. THRESHING-MACHINE, a machine operated by steam, water, or horse-power, for threshing grain (see THRESHING, below). *Note.—Thrash* and *thresh* are both in common use; the latter is the more correct, the former the more colloquial, and is the form generally used in the sense of 'drub.'

THRESH'ING: process of separating the grain or seeds of plants from the straw or haulm. The first method known to have been practiced was the beating out of

the grain from the ears with a stick. An improvement was the practice of the ancient Egyptians and Israelites to spread out the loosened sheaves of grain on a circular piece of hard ground 50-100 ft. in diameter, and to drive oxen forward and back over it, so as to tread the grain out; but as this mode damaged a portion of the grain, it was partially superseded in later times by the threshing-sledge (Egypt. *noreg*, cf. Heb. *moreg*), a heavy frame mounted on three rollers, which was dragged over the heaps of sheaves. The use of the stick was, however, retained for threshing the lighter kinds of grain. Similar methods of threshing were employed by the Greeks and Romans; but their threshing-sledge, still seen in operation in Greece, Asia Minor, Georgia, and Syria, differed from the eastern one by having pieces of iron or sharp flints fastened to the lower side in place of rollers. The primitive implement in n. Europe was the stick; and an improved modification of it, the *flail*, is still sometimes used there and on small farms in the United States. The flail consists of two sticks loosely fastened at one end by stout thongs (*caplins*); one stick (the *hand-staff*) is used as a handle by the workman, and by a circular swing round his head he brings down the other stick (the *swiple* or *swingle*) horizontally on the heads of the loosened sheaves spread out on the barn-floor. The average number of bushels of grain which one man can thresh and clean in a day is about 7 of wheat, 8 of rye, 15 of barley, 18 of oats, and 20 of buckwheat.

The first threshing-machine of modern times which was at all practical was invented and patented by Michael Menzies, of Edinburgh, Scotland, 1732. It consisted of several flails similar to those used by hand, was operated by water-power, and did fairly good work, but was not durable. Other machines, on different principles, were constructed; but nothing satisfactory was secured till Andrew Meikle, Scotch millwright, invented, about 1776, a machine which, a few years later, he brought to such perfection that many of its essential features are retained in the recent forms. Until a comparatively recent period, several men were required with each machine, to separate the grain from the straw and clean it from the chaff; but the improved forms shell, separate, clean, and measure the grain, and by means of an elevator carry the straw to a mow or stack. The grain is shelled by passing it under a rapidly revolving cylinder containing many spikes and running in a concave bed from which numerous spikes protrude. On the great wheat-farms of the west grain is threshed as it is harvested. A good threshing-machine driven by two horses will thresh and clean about the following number of bushels of grain per day: wheat 160, rye 170, barley 200, oats 300, and buckwheat 250. A large steam-power machine will thresh and clean 5 to 8 times these quantities. Machines for threshing corn, called corn-shellers, are made in a variety of styles for hand, horse, or steam power. Special

machines are made for threshing rice; and others for shelling, hulling, and cleaning clover-seed. As there is extreme variation in the proportion of clover-seed to the heads, the capacity of a good machine for cleaning it ranges from 20 to 100 bushels per day. Machines are made also for threshing rye when it is desired to keep the straw even and unbroken, so that it can be bound in bundles and sold for manufacturing or other purposes: they will shell and clean 200 to 300 bushels of grain per day. If the grain is quite ripe, threshing can be done immediately after harvesting; but if the kernel is not then hard, the work should be delayed a few days or weeks, till ripening is complete. When this point is reached, threshing is to be promptly done, to prevent loss of grain by depredations of rats. As machines do the work more thoroughly as well as more rapidly than hand-labor, their use is found desirable wherever large quantities of grain are produced.

THRESHOLD, n. *thrĕsh'ōld* [OE. *threswold;* AS. *therscwald;* Icel. *threskjöldr,* a threshold: AS. *therscan,* to thresh; *weald* or *wald,* a wood]: the bar on which we tread in entering a house; the door-sill; gate; entrance; the point of entering or beginning; outset, as of an enterprise.

THRESHOLD, in *Psychology:* the term threshold or limen is used in psychology to designate the fact that a stimulus must possess a sufficient intensity before it can elicit a sensation. The point at which the sensation appears is regarded as the threshold and as measured by the physical intensity of the stimulus. Thus a sound if too weak, cannot be heard. If it grows in intensity it is presently heard occasionally, then heard always when given. The term is also applied to the so-called 'difference threshold.' If a series of intensities of the same tone are heard, it will be found that these intensities must differ from one another by a certain amount in order that they may be distinguished. This amount is known as the difference threshold. For related topics, see PSYCHOPHYSICS.

THREW, v. *thrô:* pt. of THROW (q.v.).

THRICE, ad. *thrīs* [from Eng. *three*]: three times; very highly; a word of amplification, as thrice-happy. THRICE-FAVORED, a. highly favored.

THRID, n. v. *thrĭd:* a variant of *Thread* (q.v.).

THRĪFT, n. *thrĭft* [from Eng. *thrive*]: a thriving state or condition; economical management in regard to means or property; economy; sparingness; frugality; parsimony; the *Armeria marit'ima,* ord. *Plumbag'ināceæ,* or sea-pink (see below). THRIFT'Y, a. *-ĭ,* economical; careful; industrious and frugal; prudent in the management of property; in *OE.,* well-husbanded. THRIFT'ILY, ad. *-lĭ.* THRIFT'INESS, n. *-nĕs,* economical management of property; frugality. THRIFT'LESS, a. *-lĕs,* lacking in

thrift; extravagant. THRIFT'LESSLY, ad. *-lĭ.* THRIFT'-LESSNESS, n. *-nĕs,* the state or quality of being without economy or frugality.

THRIFT: plant of the genus *Armeria,* nat. order *Plumbagineæ,* having the flowers collected into a rounded head, a funnel-shaped dry and membranous calyx, five petals united at the base, five distinct styles, and five stamens attached to the base of the petals. By many botanists this genus has been regarded as a subdivision of the genus *Statice,* from which it is distinguished chiefly by having the flowers in heads.—The Common Thrift (*A. maritima* or *vulgaris*) grows in turf-like tufts, with linear leaves, scapes a few inches high, and beautiful rose-colored flowers, an ornament of the sea-coasts of Europe, and frequent on high mountains. It is often planted in gardens as an edging, for which it is very suitable, being of a fresh green all the year, and exhibiting its fine flowers in profusion in July and August; but it requires to be renewed every two or three years, the smallest rootless sets growing, however, with great readiness, in the moist weather of spring. The flowers are an active and useful diuretic. From two drams to an ounce of the flowers freshly gathered and quickly dried, should be gently boiled, and the patient allowed to drink at will of the decoction. Some aromatic, as anise or cinnamon, is added.

THRILL, v. *thrĭl* [a form of THIRL 1: comp. also DRILL 1: AS. *thyrlian,* to pierce]: to pierce; to penetrate; to have the quality of piercing; to penetrate with a sharp tingling sensation or wave of feeling; to feel a sharp tingling sensation throughout the whole body; to shiver; to quiver: N. a sharp tingling sensation; a sudden permeating wave of feeling, as of horror. THRILL'ING, imp.: ADJ. causing or fitted to cause a thrill, as a *thrilling* adventure. THRILLED, pp. *thrĭld.* THRILL'INGLY, ad. *-lĭ.* THRILL'INGNESS, n. *-nĕs,* the quality of being thrilling.

THRINAX, n. *thrī'năks* [Gr. *thrinax,* a fan]: a genus of W. I. fan-palms, ord. *Palmăcĕæ*—so named from their fan-shaped leaves.

THRIPS, n. *thrĭps* [Gr. *thrips,* a wood-worm]: genus of small insects, forming the order *Thysanop'tĕra;* a kind of blight on some trees, caused by the insect.—Thrips is allied to *Aphis* (q.v.), and included in the family *Aphidii* of some etymologists. The species are numerous, and widely distributed. They are very active, and some of them very injurious to cultivated plants, on whose juices they feed. When disturbed, though they use their wings, their motion resembles leaping rather than flying. The wings are much fringed. A common British species is *T. cerealium,* an insect not a line in length or in extent of wing, which resides in the spathes and husks of cereal grasses, particularly wheat and rye, in the beginning of summer, causing the grain to shrivel, and which at an earlier season causes the abortion of the ear by punctur-

ing the stems above the joints. It is most injurious to late-sown wheat, probably because the plants are weak, and therefore easily injured, at the time when the *Thrips* abounds. The larva is deep yellow, part of the head and two spots on the thorax dusky. The pupa is pale yellow and active. The perfect insect is flat, smooth, and pitch-color. The male is wingless, the female winged.

THRISSA, n. *thrĭs'să* [Gr. *thrissa,* a kind of anchovy full of small hair-like bones—from *thrix,* a hair or bristle]: a fish of the shad and herring kind whose flesh is considered as sometimes poisonous, found in the waters of tropical countries.

THRIVE, v. *thrīv* [Icel. *thrifa,* to seize, to lay hold of; *thrifask,* to thrive: Sw. *trifvas;* Dan. *trives,* to thrive: Norw. *triva,* to snatch]: to prosper, particularly by economy and good management; to increase in goods and property; to flourish; to grow. THRI'VING, imp.: ADJ. prosperous or successful; increasing: N. act of growing; growth; healthful increase. THRI'VINGNESS, n. *-nĕs,* the state of being prosperous. THRIVED, pt. *thrīvd,* or THROVE, pt. *thrōv,* did thrive. THRIVEN, pp. *thrĭv'n.* THRIVINGLY, ad. *thrī'vĭng-lĭ.* THRI'VER, n. *-vĕr,* one who thrives.

THRO', *thrô:* a short form of THROUGH (q.v.).

THROAT, n. *thrōt* [AS. *throte;* Dut. *strot;* It. *strozza,* the throat]: the fore part of the neck, in which are the gullet and the windpipe or trachea; the passage from the mouth to the stomach or lungs; the contracting part of a chimney; in *ship-building,* the hollow inside part of a knee-timber; the entrance, as of a gorge or valley. TO CUT ONE'S THROAT, to murder one. CUT-THROAT, a man capable of any violence or any crime. TO LIE IN ONE'S THROAT, to tell a monstrous falsehood; to lie flatly.

THROAT DISEASES: for common inflammatory sore throat (Tonsillitis), see QUINSY: for other important throat diseases, see APHTHÆ; THRUSH; DIPHTHERIA; LARYNGITIS; PHARYNGITIS; BRONCHITIS; CROUP. For *Bronchocele* or *Goitre,* which to a certain degree, is an affection of the throat, see GOITRE.

The disease *Follicular Inflammation of the Pharynx* (called sometimes Clergyman's Sore Throat, or *Dysphonia Clericorum*), shows itself first by huskiness of the voice, with more or less coughing, hawking, and expectorating from an uneasy sensation in the throat; there is, moreover, constant inclination to swallow. On examining the back of the throat, its mucous membrane is seen covered with granulations, caused by an accumulation of secretion in the follicles; these sometimes burst and discharge their contents, and this discharge is occasionally followed by ulceration. The disease commonly arises from too prolonged or powerful exercise (or too sudden exercise after several days of quietness) of the voice by persons in whom the mucous membrane of the throat is in relaxed condition. Perfect rest from public speaking, preaching,

acting, etc., is more important than anything else in treatment, and a winter and spring residence in a mild and equable climate is expedient. Tonics, such as iron, quinine, and—only under medical prescription—strychnine may be tried; and the local application of a strong solution of nitrate of silver, applied by a probang to the affected mucous membrane, is usually of service. Speakers whose voice is not well placed will often obtain relief of their throat trouble by a few lessons in voice culture.

Wounds in the Throat.—These are comparatively seldom the result of accident; they are more often made with suicidal or murderous intent. The first duty of the surgeon in a case of cut throat is to arrest the flow of blood. Ligatures are applied to wounded arteries, and steady pressure is made with the finger (beneath which a small pad of sterilized lint is placed) to wounded veins, such as the external jugular. If the internal jugular is wounded, fatal hemorrhage will very rapidly ensue, unless pressure with the finger is maintained for a long time. With a knowledge of these means of checking hemorrhage by pressure any intelligent person may save life. When the bleeding has completely ceased, but not till then, means may be taken for bringing together the edges of the wound. The patient should be placed in bed in a moderately warm room, the shoulders well raised by pillows, and the head bent forward and retained in that position by a bandage, and the wound should be dressed antiseptically.

THROB, v. *thrŏb* [Ger. *trab*, representing the jolting trot of a horse: Sw. *trubb*, originally signified 'a jog'; *drabba*, to strike against, to knock: Russ. *trepat*, to knock gently: L. *trepĭdus*, anxious, alarmed]: to heave or beat with more than usual force and rapidity, as the heart or pulse; to palpitate: N. a beat or strong pulsation, as of the heart. THROB'BING, imp.: ADJ. beating with unusual force, as the heart or pulse: N. act of beating with unusual force, as the heart. THROBBED, pp. *thrŏbd*. THROBBING PAIN, a pain seemingly increased or caused by the pulsation of arteries.

THROE, n. *thrō* [Icel. *thrá*, a throw: AS. *thrawan*, to twist: Scot. *thraw*, to wreathe, to twist (see THROW)]: violent pang; extreme pain or agony; the pains of travail or childbirth: V. to put in agonies; to be in agony.

THROMBUS, n. *thrŏm″bŭs* [Gr. *thrombos*, a clot of blood]: in *surg.*, a plug formed by coagulation of the blood in a vessel during life, or some time before death, generally in veins, but it may occur in an artery, or even in the heart. THROMBOSIS, n. *thrŏm-bō′sĭs* [Gr. *thrŏmbōsis*, a curdling or coagulation]: an affection of the blood-vessels (either veins or arteries), which consists essentially in a coagulation of blood (forming a true clot) at a certain fixed spot. Under certain morbid conditions the blood has a tendency to coagulate in its vessels during life, on the least provocation. Thus, slight pressure on

the side of a vein will sometimes induce this coagulation; in other cases it is due to inflamamtion of the tissues which surround a vein, or laceration of a vein, backward along the course of the artery until the point is reached where another vessel branches off from it through which the flow of blood is maintained. Thrombosis is an occasional cause of sudden death after a surgical operation. A clot thus formed in a vessel tends to increase and extend. See EMBOLISM.

THRONDHJEM, or TRONDHJEM, *trŏnd'yĕm* (Ger. *Drontheim*): town, the ancient Nidaros, and former capital of Norway; in the Fjord of Throndhjem, at the mouth of the little river Nid, 240 m. n. of Christiania. It consists of the old town, founded 997, and the suburbs Blakland and Ilen; and is built on the picturesque and undulating slopes of the Nid-Elv, and has regular and broad streets. The fortified islands of Munkholm and Christiansteen defend the capacious harbor, never closed by frost on the seaward side. Among the public buildings most noteworthy are the Kongens-Gaard, or old palace, and St. Olaf's Church, the remains of the old cathedral, now partially restored, built 12th century by Archbishop Oeysteen, who entered this noble Gothic pile on the site of the two early Christian churches, founded by Harald Haardrade and Olaf II. The fine western extremity of the nave was not completed till 1248. The body of the murdered St. Olaf was preserved within a costly shrine in the chancel of Christ Church, which ranked as the metropolitan church of Norway, where the kings of Norway have been crowned since the time of Magnus V. (1164). Throndhjem is the seat of government for the province and of a bishopric; and has a public exchange, the principal national bank, a public library, museum, various literary and scientific institutions, an institution for the deaf and dumb, an insane asylum, etc. The chief articles of trade are fish, tar, and deal, and copper from the neighboring mines of Röros. Salted cod and herrings, plentiful at the entrance of Throndhjem Fjord, are important articles of export. Besides its shipping and coasting trade, Throndhjem is a manufacturing centre, and has good sugar-refineries, distilleries, etc. The environs are picturesque, and its position is attractive, notwithstanding its high latitude (63° 25′); while the numerous historical events with which it is associated render it one of the most interesting towns in the Scandinavian kingdoms. The preponderance of wooden houses has diminished of late years; and the local authorities are endeavoring to enforce the use of stone for building purposes in consequence of the frequent occurrence of great fires.—Pop. (1900) 38,180.

THRONE, n. *thrōn* [L. *thrŏnus;* Gr. *thrŏnos,* a seat: F. *trône*]: a royal seat; a raised chair of state, usually richly ornamented and surmounted by a canopy, and intended for the use of a sovereign or other potentate; the

seat of a bishop in his cathedral; metaphorically, sovereign power and dignity: V. to place on a royal seat; to exalt; to enthrone, as a bishop. THRON'ING, imp. THRONED, pp. *thrōnd*, placed on a royal seat; exalted. THRONE'LESS, a. *-lĕs*, without a throne.

THRONG, n. *thrŏng* [AS. *thrang*, a press or crowd: Dut. and Ger. *drang*, a throng; *dringen*, to press: Icel. *thröng*, a throng: Dan. *trang*, pressed, narrow: Gael. *droing*, people]: a great number of individuals pressing or pressed into a close body; a crowd; an assemblage; a multitude: V. to crowd or press; to incommode with numbers crowding together; to come in multitudes; to fill with large numbers; to swarm: ADJ. in *Scot.* and *prov. Eng.*, swarming; crowded; busy. THRONG'ING, imp.: pressing together in great numbers: N. act of crowding together. THRONGED, pp. *thrŏngd:* ADJ. filled with a multitude of persons pressing together.

THROOP POLYTECHNIC INSTITUTE: located at Pasadena, Cal. It was founded in 1891 by Amos G. Throop to provide a liberal and practical education for both sexes. It is entirely non-sectarian, the charter providing that a majority of the trustees 'shall not belong to any one religious denomination.' Its organization comprises five schools: (1) the grammar school; (2) the academy; (3) the commercial school; (4) the normal school; (5) the college. The academy offers three courses, classical, literary and scientific; and the college three courses, chemistry, electrical engineering, and natural science, all leading to the degree of B.S. Some studies in each course are required, and some elective. Throughout the grammar and high school grades, manual training is a regular part of the curriculum; instruction is given in wood carving, sloyd, carpentering, forging, machine-shop work, clay modeling, mechanical and free-hand drawing, sewing and domestic science. The commercial school provides a two years' course; and the normal school three two years' courses in manual training, domestic economy, and free-hand drawing and designing, all of which include psychology, pedagogy, and history of education. There is also a summer school of art and manual training, designed mainly for teachers; work done in this school is credited toward a normal diploma. The institute (1904) occupies two buildings, Polytechnic Hall and East Hall. The library contains 5,000 volumes; and the Pasadena Public Library is also open to students. The students number 400.

THROPPLE, n. *thrŏp'pl:* same as THRAPPLE.

THROSTLE, n. *thrŏs'l* [Ger. *drossel;* Icel. *thröstr;* Norg. *trost;* L. *turdus*, a thrush (see THRUSH 1)]: the song thrush; a machine for spinning cotton, wool, etc., from the rove (see SPINNING). THROST'LING, n. *-lĭng*, a morbid swelling in the throat in animals of the cow kind —probably so named from the *whistling* which accompanies the breathing of animals suffering from the disease.

THROTTLE, v. *thrŏt'tl* [from Eng. *throat*]: to prevent respiration by pressure on the windpipe; to choke; to strangle; to suffocate: N. the windpipe; the throat. THROT'TLING, imp. *-tlĭng*. THROTTLED, pp. *thrŏt'tld*. THROTTLE-VALVE, a flat thin disc valve which lies diagonally across a round pipe, closing it partially or entirely. Used in dampers or flues, and in the smoke pipes of engines leading from boilers, to regulate the passage of smoke and steam.

THROTTLE: the manner in which the steam is admitted to the steam-pipe leading to the steam-chests. It is effected by means of a double poppet-valve called the 'throttle-valve,' placed in the throttle-pipe near the top of the dome. This valve is operated by the engineer by means of a lever called the 'throttle-lever,' located in the cab, and connected by a rod called the 'throttle-stem' to the lower arm of a 'bell-crank' called the 'throttle bell-crank,' the other arm of which is connected by a rod to the throttle-valve.

THROUGH, ad. *thrô* [Goth. *thairh;* Ger. *durch;* AS. *thurh,* through: L. *trans,* across]: from one end or side to the other; to the end or conclusion: PREP. from end to end of; from side to side of; expressing passage among or in the midst of; throughout; on account of; by means of. THROUGHOUT, ad. in every part: PREP. in every part of; from one extremity to the other. THROUGHLY, ad. *-lĭ*, in *OE.*, completely; fully; entirely; thoroughly. TO CARRY THROUGH, to accomplish. TO FALL THROUGH, to be given up, as a project or plan; to fail or be abandoned. TO GO THROUGH WITH, to prosecute to the end, as a scheme. THROUGH AND THROUGH, completely through; pierced wholly from side to side. THROUGH-TICKET, a ticket for a whole journey. THROUGH-TRAIN, on a *railway,* a train which goes through to the end of the line or division. THROUGH TUBES, the flue tubes of horizontal boilers. They pass from one end of the boiler to the other, and are attached to the end plates.

THROVE, v. *thrōv:* pt. of THRIVE (q.v.).

THROW, v. *thrō* [original meaning, to turn or whirl, and thence, to cast or hurl: AS. *thrawan,* to twist: Scot. *thraw,* to wreathe or twist: W. *troi,* to turn: Ger. *drehen,* to turn, whirl: L. *torquĕrĕ,* to twist]: to turn or twist; especially in the *silk manufacture,* to form into threads by twisting two or more filaments together; to shape by turning as in a potter's wheel, a lathe or the like; to heave; to pitch or fling; to toss; to put or place carelessly; to overturn or prostrate, as in wrestling; to cast, as dice; to perform the act of hurling or casting; to bring forth young, as a rabbit: N. the act of hurling or flinging; a driving or propelling, as from the hand or from an engine; a cast, as of dice; the distance to which a thing is or may be thrown, as a stone's throw; in *OE.,* a short space of time; a little while; a stroke; a blow; an effort; in *mining,* a fault or dislocation of the strata,

or the amount of vertical produced by such a fault (see DISLOCATION, in Geology). THROW'ING, imp. THREW, pt. *thrô,* did throw. THROWN, pp. *thrōn,* flung; sent to a distance. THROWER, n. *thrō'ėr,* one who throws. THROW'STER, n. *-stėr,* one who throws silk for the weaver. TO THROW ABOUT, to scatter; to try expedients. TO THROW AWAY, to lose by neglect or folly; to reject. TO THROW BACK, to retort; to reject; to refuse. TO THROW BY, to lay aside as useless. TO THROW DOWN, to overturn; to destroy; to depress. TO THROW IN, to put in; to deposit with others; to join in or with. TO THROW OFF, to expel; to reject or discard. TO THROW ONE'S SELF DOWN, to lie down. TO THROW ONE'S SELF ON or UPON, to resign one's self to the favor, clemency, or power of. TO THROW OUT, to reject; to expel; to eject; to utter carelessly or insidiously; to emit; to confuse. TO THROW OVER, to give up; abandon; cast off. TO THROW UP, to resign; to vomit; emit; eject. TO THROW SILK, to twist two or more singles into a cord, in a direction contrary to the twist of the singles themselves. THROWN SILK, silk consisting of two or more singles twisted into a cord. TO THROW UP THE SPONGE, to yield or submit; to give up the contest—in allusion to the custom in pugilistic encounters of tossing up the wet sponge used to wipe the face during the fight in token of the submission of one of the combatants.

THROWSTER. See under THROW.

THRUM, n. *thrŭm* [Ger. *trumm,* a short thick piece, stump, end: Icel. *thrömr,* a thrum, brim of a thing: Norw. *trumm,* edge, brim]: the ends of weavers' threads which remain attached to the loom when the completed web has been cut off; any coarse yarn or loose threads: V. to stick short pieces of yarn through; to knot; to fringe. THRUM'MING, imp.: ADJ. knotting; twisting. THRUMMED, pp. *thrŭmd.* THRUMMY, a. *thrŭm'mĭ,* containing or resembling thrums. THRUM-EYED, a. *thrŭm'īd,* in *bot.,* having short styles, applied to flowers, especially of *Primŭla,* when the stigma does not appear at the upper part of the tube of the corolla.

THRUM, v. *thrŭm* [Icel. *thruma,* to make a noise, to thunder: Sw. *trumma,* to drum (see DRUM)]: to play idly or unskillfully with the fingers on a stringed instrument; to make a dull noise, as by beating or drumming with the fingers on wood.

THRUSH, n. *thrŭsh* [AS. *thrysce;* OHG. *drosca;* Icel. *thröstr;* Sw. *trast,* a thrush]: a singing bird of various species; the mavis; bird of the family *Turdidæ;* having booted tarsus, wing more than 3 in., and the young spotted; and, especially of the genus *Turdus,* the adult with spotted breast. The species are numerous and widely distributed, some inhabiting temperate, and some found only in tropical regions. The common British species are the Blackbird (q.v.), Fieldfare (q.v.), Redwing (q.v.), Ring Ouzel (q.v.), Song Thrush, and Missel Thrush.—The SONG THRUSH, or THROSTLE (*T. musicus* or *Merula mu-*

sica), the mavis of the Scotch, is not quite 9 inches in length. Its plumage is brown, of various finely-mingled shades; throat, sides of the neck, breast, and flanks yellowish, spotted with dark brown; belly nearly white, with a few spots of dark brown. It is found in all parts of Europe. The throstle is well known as one of the sweetest songsters of the groves. In captivity, it has been taught simple airs.—The Missel Thrush (*T. viscivorus* or *M. viscivora*) is about 11 inches in entire length, and is the largest and strongest European species of the genus. The plumage is very similar to that of the Song Thrush; but the tail is slightly forked, differing from that species; and the spots on the belly are more numerous, and black. The song is loud and clear, but not equal to that of the Song Thrush or of the blackbird. The bird delights in pouring forth its song from the very top of a tall tree. It also very often sings before or during wind and rain, whence it has the name Storm-cock. Its range extends through great part of Asia.

Of the American thrushes, the Wood Thrush (*Turdus mustelinus*), a charming singer of e. N. Amer., has cinnamon-brown color most distinct on the head; the Hermit Thrush (*T. Pallasii*, lately changed by absurd priority to unmusical *aonalaschkæ*, referring to Unalaska Island), is of N. Amer. generally, very musical, and has the above color chiefly on the tail; the Tawny or Wilson's Thrush (*T. fuscescens*), of e. N. Amer., has a greater range of notes than those above mentioned, and has the reddish color mostly on the back; the Gray-cheeked Thrush (*T. aliciæ*), of n. N. Amer., has the upper parts entirely olive, as also the Olive-backed Thrush (*T. ustulatus*), of all N. Amer., which differs in having an orbital ring and the sides of the head buffy; it has a w. variety that is russet above. The Varied Thrush (*T. nævius*), of the Pacific slope, occasional in the east, has a pectoral band, not spots. The Mocking Thrushes, lately placed among *Troglodytidæ*, include, besides the Brown Thrush, or Thrasher (q.v.) (and its s.w. var., the Long-billed Thrush), an extreme s.w. species—the Curved-billed Thrush, also the Crissal Thrush, of Colo. and s., and the Sickle-billed Thrush or California Mocking-bird—the last two with breast unspotted.—A common W. Indian species (*T.* or *M. leucogenys*) is familiarly known by the name Hopping Dick, and is a general favorite from its bold, lively manners, and its sweet song.

THRUSH, n. *thrŭsh* [Dan. *tröske*, thrush on the tongue]: a disease in the feet of horses and some other animals, of an inflammatory and suppurating kind: a disease of infancy: Aphthæ (q.v.).—*Thrush* is essentially a disease of early infancy, though it may occur at any age. Its characteristic symptom is the presence of small roundish white specks or patches on the lining membrane of the cavity of the mouth and throat, on the surface of the tongue, the angles of the lips, etc. These

patches, termed *aphthæ,* appear like minute drops of tallow or fragments of curd, and are formed by elevated portions of epithelium covering a drop of serous fluid; and as the dead epithelium falls off, a raw surface, or a dirty ash-colored spot, is left exposed. In thrush, crops of these little patches commonly succeed one another. These spots render the mouth hot and tender, in consequence of which the act of sucking is difficult and painful. In association with these local symptoms are indications of general constitutional disturbances, such as feverishness, drowsiness, vomiting, flatulence, colicky pains, diarrhœa, etc. The stools are green and slimy, and frequently acrid. The vomited matters also are green, and have a strongly acid smell, as has the breath also. The malady sometimes seems to be the result of improper diet, if the child is being brought up by hand; or of unwholesome milk from a diseased or intemperate nurse; or bad ventilation, etc. The actual cause is the presence of a micro-organism, the thrush fungus, or *Oïdium albicans.* The disorder usually lasts eight or ten days, and is attended with danger only when the local affection runs into a low form of gangrenous ulceration. As undue acidity of the stomach seems an almost general symptom, the diet should be carefully regulated, and mild *antacids* prescribed. As a local application to the patches, honey and borax may be applied with a camel-hair pencil; or a pinch of a mixture of powdered borax and loaf-sugar (1 to 8 or 10) may be placed occasionally on the tongue, and the infant allowed to spread it over the mouth.

Thrush may be propagated by contagion, and in some institutions is at times almost endemic. It may be conveyed from one babe to another through an infected nipple of a nurse, or by means of infected spoons, feeding-bottles, teats, etc. Usually the mucous membrane of the mouth underlying the fungous patches is of a bright or livid red, but when the system of the patient is much deteriorated, and the mycelium has penetrated deeply, shallow ulcerations may result. Sometimes the fungus of thrush is found in diphtheritic membranes. Any doubt as to the nature of white patches in the mouth should be settled by a microscopic examination. Of itself thrush is not dangerous, but it is usually significant of a deteriorated state of health. Occurring in apparently healthy children, it lasts but a few days; in children having gastro-intestinal catarrh and diarrhœa, and who are much debilitated, it may last for weeks, fresh spots appearing as others vanish. The redness and excoriation around the anus and adjacent skin of infants so affected is vulgarly regarded as an indication that the 'thrush has run through the patient,' and if the mouth condition has improved it is considered a favorable sign. While the thrush-fungus has been found in the œsophagus, and even lower in the alimentary canal, there is no reason to believe that it is the cause of the redness and excoriation above referred to, which are rather due to a super-

ficial dermatitis resulting from an excess of starchy food and a vitiated blood state.

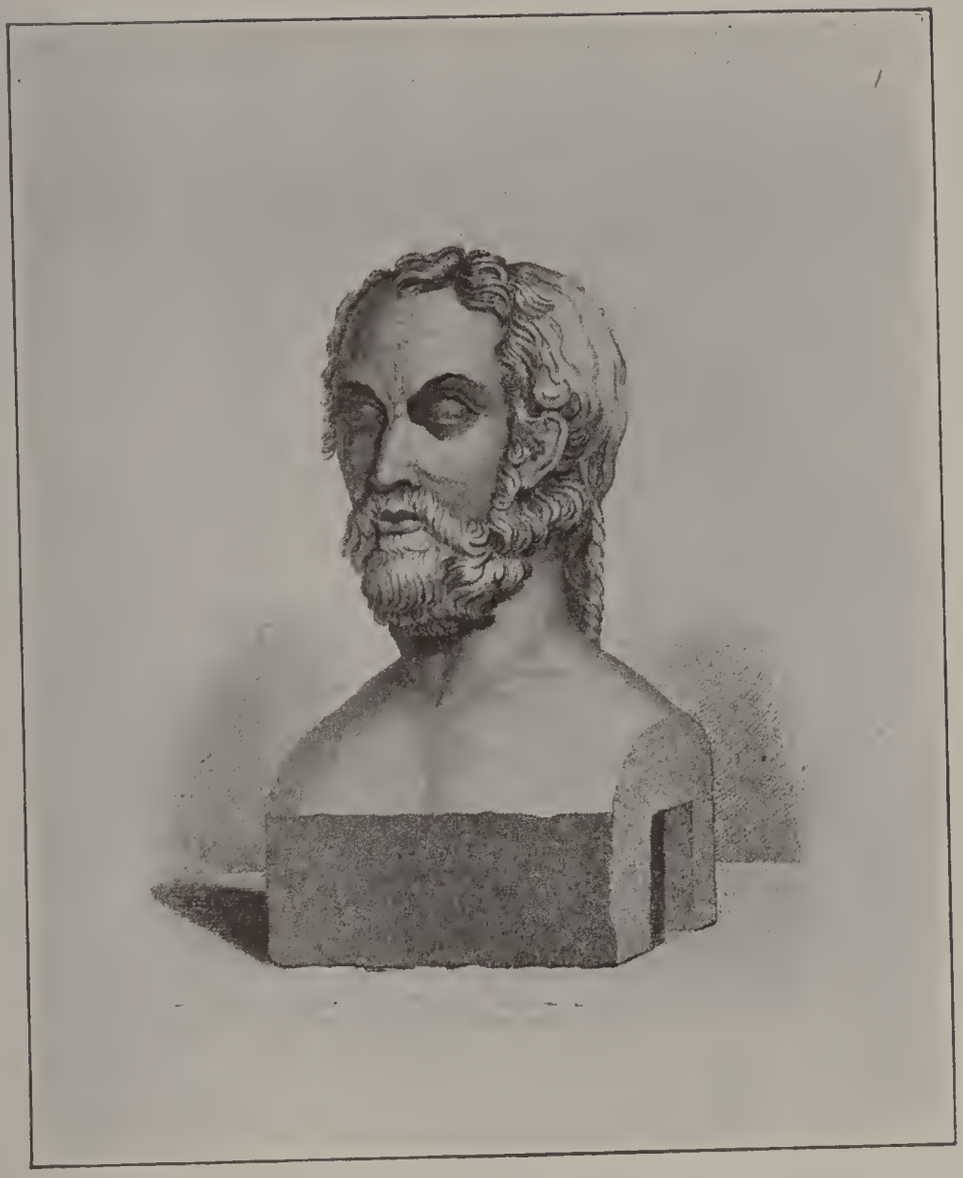
In the horse, thrush consists in inflammation and ulceration of the sensitive surfaces within the frog, giving rise to a fetid discharge, constituting unsoundness, and usually causing lameness. Lack of cleanliness is the chief cause. Daily, when the horse returns to his stable, the foot should be washed out with soap and water, carefully dried, and the fissures filled with mineral tar. If amendment does not speedily ensue, a dressing of calomel should be substituted for the tar several times a week. Ragged or loose portions of the frog may be removed by the knife or scissors.

THRUST, n. *thrŭst* [Icel. *thrysta*, to press, to thrust: comp. L. *trūdĕrĕ*, to thrust]: a violent and sudden push; a sudden push or drive, as with a pointed weapon, or with the foot; in *arch.*, outward pressure of an arch against its abutments, or of rafters, beams, etc., against the walls: V. to push or drive with force; to drive or force, as a thing into a body, or between bodies; to stab; to squeeze in; to attack by a thrust; to enter by pushing or squeezing in; to push forward. THRUST'ING, imp.: N. the act of pushing with force or squeezing in. THRUST'ED, pp., or THRUST, pp. *thrŭst*. THRUST'INGS, n. plu. *-ĭngz*, that which is last pressed out of the curd by the hand; also spelled THRUTCHINGS, *thrŭch'ĭngz*. HOME THRUST, an unexpected rebuke administered to a person, drawn from his own statements, arguments, or conduct. —SYN. of 'thrust, v.': to push; drive; assault; shove; attack; assail; propel; stab; compress; impel; urge; obtrude; intrude.

THRUST, n. *thrŭst:* OE. for THIRST.

THRUSTLE, n. *thrŭs'l:* the thrush or throstle.

THUCYDIDES, *thū-sĭd'ĭ-dēz:* great historian of the Peloponnesian war, and ranked as the greatest historian of antiquity: prob. about B.C. 471-396 (?); born in the demus Halimus, and said to have been the son of Olorus and Hegesipyle, and connected with the family of Cimon. It is stated—on authority equally conjectural, however—that he was instructed in oratory by Antiphon, and in philosophy by Anaxagoras. Certain it is that, Athenian as he was, of good family, and resident in the most cultivated community in Greece, he had a most liberal education. He was further possessed, either by inheritance or by acquisition through marriage, of gold-mines in that part of Thrace opposite the island of Thasos. He had two residences, one at Athens, one in Thrace. He left a son, Timotheus, perhaps also a daughter, who is said by some scholars to have written the eighth book of his history. We know from himself that he was one of the few sufferers who recovered from the terrible plague at Athens. We have no direct evidence as to his having exercised in public the oratorical talent which he reveals in



THUCYDIDES.

his history; but it is certain that he held military command, and that he commanded an Athenian squadron of seven ships at Thasos, B.C. 424, when Eucles, who commanded in Amphipolis, solicited his assistance against Brasidas. The expected arrival of a superior force induced Brasidas to offer Amphipolis favorable terms, which were accepted. T. arrived on the evening of the same day on which Amphipolis had surrendered; and though he prevented Eion, at the mouth of the Strymon, from falling into the enemy's hands, still his failure to save Amphipolis caused him to be sent into exile, probably to avoid the severer punishment which his enemy Cleon, then popular with the Athenians, was designing for him. Where his exile was spent is not known. Probably he lived long in the Peloponnesus; perhaps also in Sicily, as has been inferred from his minute descriptions of Syracuse and its neighborhood. According to his own account, he lived in exile 20 years, and probably returned to Athens about the time when Thrasybulus liberated it, in the beginning of B.C. 403. Ancient authorities all agree that his death was by violence (by robbers, according to some), though whether it occurred at Athens or in Thrace is unknown. The time when he wrote his history is uncertain. He is supposed, from hints supplied by himself, to have kept a register of the events of the war, from its outbreak to its close. His great work, chronologically divided into winters and summers—each summer and winter making a year—was subsequently rearranged, probably by Alexandrine critics, into the books and chapters as we now have it; and of these books the eighth (and last) is supposed either to have not been written by him, or to have not received the careful revision which he gave to the previous seven. There is hardly a literary production of which posterity has entertained a more uniformly favorable estimate than the history of T.—a high distinction due to his undeviating fidelity and impartiality as a narrator; to the masterly brevity of his style, in which he is content to give in a few simple yet vivid expressions the facts which must have often required his labor for weeks or months to collect, sift, and decide upon; to the sagacity of his political and moral observations, in which he shows the keenest insight into the springs of human action, and the mental nature of man; and to the unrivalled descriptive power exemplified in his account of the plague of Athens, and of the Athenian expedition to Sicily. Often, indeed, does the modern student of Greek history share the wish of Grote, that the great writer had been a little more communicative on collateral topics, and that some of his sentences had been expanded into paragraphs, and some of his paragraphs into chapters. But this want cannot have been felt by the contemporaries of T., while the fate of other ancient historians warns us that had his work, like theirs, been looser in texture, or less severely perfect, it would not have survived, as it has done, the wearing influence of time, or remained, in its own language, the *ktema es aei*—the 'possession for ever'—which it has proved to be to the world. The best editions are those of Poppo (11 vols. Lps.

1821–40), of Krüger (2 vols. Berl. 1846–7), and—at least for historical illustration—of Arnold (3 vols. Oxford 1830–35). The best Eng. transl. is by Richard Crawley (1874); that of the Rev. Thomas Dale also is good.

THUD, n. *thŭd* [AS. *thoden*, noise, din: L. *tundĕrĕ*, to pound]: a stroke or blow causing a dull sound, or the sound itself; a heavy blow.

THUG, n. *thŭg* [Hind. *thug*, a deceiver, a robber]: formerly, in *India*, one of an association or confraternity of professional robbers and murderers professedly in honor of Kâlî, wife of S'iva (see below). THUG'GEE, n. *-gē*, or THUG'GERY, n. *-gĕr-ĭ*, or THUG'GEEISM, n. *-gē-ĭzm*, or THUG'GISM, n. *-gĭzm*, systematic robbery and assassination such as were practiced by the Thugs.—*Thugs* is the name by which this fraternity is generally known among Europeans in more n. parts of India. In provinces southward, they are called by various other names. In s. India, they lived formerly under protection of the native chieftains, who, for a consideration, connived at their practices, which, to the uninitiated, were generally concealed under the guise of an honest industry, especially that of the culture of land.

The proceedings of the Thugs were generally these: Banding together in gangs of 10 to 50, but sometimes of a much greater number, they assumed the appearance of ordinary traders, travelling, if enabled to do so by their wealth, on horseback, with the comforts of opulent merchants; but otherwise in more humble characters. Each gang had its *Jemadar*, or leader; its *Guru*, or teacher; its *Sothas*, or entrappers; its *Bhuttotes*, or stranglers; and its *Lughaees*, or grave-diggers. Arriving at towns or villages, they pretended to meet by accident, without previous acquaintance. Some of the gang then acted as emissaries to collect information; and they endeavored to insinuate themselves into the confidence and society of persons of property on a journey; or they followed the travellers, waiting for opportunity for their murderous work. The murder was perpetrated usually by throwing round the neck of the victim a rope or cloth, and when he had been cast to the ground, the fatal injury was inflicted. Three Thugs were generally required for the murder of one man; two, at least, were thought necessary; and to strangle a man single-handed was a feat of honorable distinction among them—ennobling him who accomplished it, and even his family, for many generations. After the murder the body was usually concealed, being buried where it would not be found; thus it could happen that entire parties of travellers were destroyed, and not a vestige of them was discoverable.

The practice of Thugs was not restricted to the land: the rivers of India also were infested by bands of these murderers on boats.—The slaughter, generally indiscriminate, was to a certain extent restrained by superstition; thus, it was deemed unlucky to kill certain classes and castes; and, as a rule, the female sex was exempt altogether.

The plunder was divided in various ways: according to

one account, a portion of it was usually appropriated for the expenses of religious ceremonies, and sometimes a part for the widows and families of deceased members of the gang: the residue was distributed among the gang.

The patron goddess of the Thugs was Devî or Kâlî, wife of the god S'iva and the deity of destruction: in her name they exercised their profession, and to her they ascribed its origin. Formerly, according to their belief, Kâlî assisted them in disposing of the bodies of the victims by devouring them; and afterward presented her worshippers with one of her teeth for a pickaxe, to be used in digging graves. By all the Thugs the pickaxe was an instrument held in the highest estimation: it was consecrated to its uses under many and minutely regulated ceremonies; and it was submitted to special purifications after each time of use in the preparation of a grave. The pickaxe was the symbol of the Thug's faith, and the chief object of his numerous superstitions. All his movements were regulated by these superstitions, chief among which was his belief in omens. The Thugs, after every murder, performed a special ceremony with prayer, in honor of the terrific Kâlî. The superstitions of the Thugs were of Hindu origin; but they were largely adopted by Mohammedans also, who, while stout adherents to the tenets of the Koran, yet paid divine honors to the Hindu goddess of destruction. This inconsistency they sometimes reconcile by identifying Kâlî with Fatima, the daughter of Mohammed, and wife of Ali, and by saying that Fatima invented the use of the noose to strangle the great demon Rukutbeejdana.

At various periods, steps had been taken by the native and Eng, governments to suppress Thuggee, but in 1831 energetic measures were adopted by the Brit. authorities; and the evil has now practically disappeared.—See *Illustrations of the History and Practices of the Thugs* (by E. Thornton, Lond. 1837); and Col. Meadows Taylor's *Confessions of a Thug* (1840).

THUITES, n. *thū-ī'tēz* [Gr. *thuia*, a tree producing an aromatic gum—from *thuein*, to burn incense or perfumes]: in *geol.*, a genus of coniferous plants occurring in fragments in the shale and coal of the oolite, their imbricated stems and terminal twigs resembling those of the modern *Thuja* or *Arbor vitæ*. THU'JA, n. *-jă*, in *bot.*, a genus of evergreen tree, thickly branched, having scale-like, closely imbricated, or compressed leaves; also written THU'YA, n. *-yă*. See ARBOR VITÆ.

THULE, *thū'lē:* a name given by the ancients to an island or group of islands in the ocean to the northwest of Europe. It was thought to be the northernmost inhabited region of the earth. It is believed to have been the Shetland Islands, though some have identified it with Iceland.

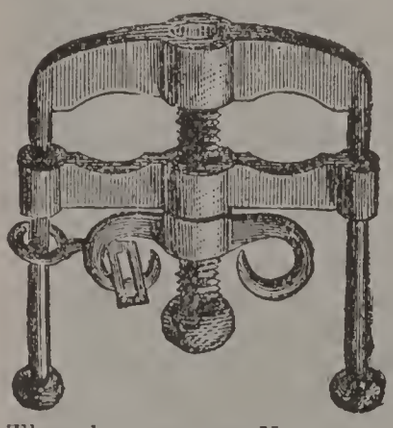
THULITE, a rose-pink variety of the mineral zoisite.

THUL'STRUP, THURE DE: American artist: b.

Sweden 1848. He entered the Swedish army in 1865; served in the Franco-Prussian war and was present at both battles of Lyons. Emigrating to the United States in 1872, he joined the staff of the *Graphic* as illustrator; was connected with the Frank Leslie publishing house in the same capacity from 1876 to 1880; when he entered the service of Harper Bros. He is especially well known as a military and historical illustrator.

THUMANN, *tô'män*, PAUL: German painter: b. Tschacksdorf 1834, Oct. 5. He was a student in the Academy of Berlin from 1853 to 1855 and subsequently worked under Julius Hübner in Dresden till the year 1860. At Weimar he studied with Ferdinand Pauwels and in 1866 was appointed professor in the Art School of that city. From 1875 to 1887 he filled the duties of professor in the Art Academy of Berlin. He has been mainly occupied in the illustration of Auerbach's *Kalender;* Goethe's *Wahrheit und Dichtung;* Tennyson's *Enoch Arden;* Chamisso's works; and Heine's *Buch der Lieder,* etc. His success in this work is due to the powerful drawing, thoughtfulness, and genuine feeling which characterize his style; yet later he lapsed into a certain sickly sentimentality and frivolity of treatment which have injured the reputation won by his early productions. Among his paintings the best are five canvases which illustrate the life of Luther, executed for the castle of Wartburg; *The Wedding of Luther; The Return of Hermann from the Battle of Teutoburg Forest;* and *The Three Fates.*

THUMB, n. *thŭm* [Sw. *tumme;* Dut. *duim;* Ger. *daumen,* a thumb]: the short thick finger of the hand next to the first or index finger, and capable of being opposed to each and all of the other digits: V. to handle awkwardly; to play or soil with the thumb or fingers; to finger. THUMB'ING, imp. THUMBED, pp. *thŭmd:* ADJ. having thumbs. THUMBKIN, n. *thŭm'kn,* or THUMB-SCREW, an instr. of torture for compressing or squeezing the thumbs, much used in Scotland during the tyrannical times of the 17th c., and by the Spanish Inquisition. The last instance of its application in Britain was about 1682, in the case of Principal Carstairs, on whom this mode of torture was inflicted for an hour and a half at Holyrood by the Scottish privy council, with the view of obtaining from him confession of the secrets of the Argyll and Monmouth parties, but without effect in producing any disclosures. THUMBIKIN, same as THUMBKIN. THUMB-STALL, a



Thumb-screw. — From an instrument in the Antiquarian Museum, Edinburgh.

kind of thimble or sheath of iron, horn, or leather, for protecting the thumb in sail-making and other work. UNDER ONE'S THUMB, under one's influence; completely in one's power. BY RULE OF THUMB, in a rude unskilful manner, not by education or imparted skill.

THUMMIM, n. *thŭm'mĭm* [Heb.]: *literally,* 'perfections'—an appendage to the breastplate of the anc. Jewish high priest: always used in the compound, Urim and Thummim, but what they were has never been satisfactorily ascertained.

THUMP, n. *thŭmp* [imitative of the sound of a blow: Icel. and Sw. *dumpa,* to thump: Dan. *dump,* sound of a heavy fall: W. *twmpian,* to thump, to stamp]: a heavy blow with something hard and thick, as with the fist, or the sound made by such a blow: V. to strike with something thick or heavy, as with a club, or the fist; to strike or fall with a dull heavy blow. THUMP'ING, imp.: ADJ. unusually heavy or large. THUMPED, pp. *thŭmpt.* THUMP'ER, n. *-ėr,* one who or that which thumps; *familiarly,* anything large or great; a whopper; a barefaced lie.

THUN, *tôn:* picturesque and ancient town of Switzerland, in the canton of Bern, 17 m. s.s.e. of the city of Bern. It stands on the Aar, one m. from the Lake of Thun, out of which the river rushes past the town in a stream of crystal clearness. The old castle of the 12th c. with its corner towers, and the venerable church, are the chief buildings. Thun is the starting-place for those who visit the Bernese Oberland, and is visited by crowds every season. Pop. 6,069.

THUN, LAKE OF: in the canton of Bern, Switzerland, between the town of Interlaken on the e., and that of Thun on the n.w.; 12 m. long, 2 m. broad, about 1,800 ft. above sea-level, and in some places between 600 and 700 ft. deep. The scenery is very attractive. Steamers ply on the lake, and there is a good post-road along the s. shore.

THUNDER, n. *thŭn'dėr* [Ger. *donner;* F. *tonnerre;* L. *tonĭtra,* thunder: Icel. *duna,* to bellow: Dan. *dunder,* a rumbling sound: L. *tonārĕ,* to thunder]: the deep and loud rumbling sound heard after a flash of lightning; the report or noise caused by a discharge of atmospheric electricity (see LIGHTNING): any very loud noise; an alarming threat or denunciation: V. to emit the loud rumbling sound which follows the discharge of atmospheric electricity; to make a loud heavy noise, especially with some continuance; to emit with noise; to publish or utter loud denunciations or threats. It is well known that a lightning flash involves a sudden expansion of the air in the direct line of discharge, thus producing an explosive effect which is doubtless the origin of thunder. The intensity of this effect may be greatly reinforced

by the sudden conversion into vapor of any masses of water or other liquid that may lie in the path. In this way the bursting asunder of the limbs and bodies of trees and the boring of trenches in the ground is explained. THUN'DERING, imp.: ADJ. making a loud noise, especially with some continuance; uttering a loud sound: N. the report following an atmospheric discharge of electricity. THUN'DERED, pp. *-dėrd.* THUN'DERER, n. *-dėrėr,* one who thunders; a power that thunders or acts irresistibly; a name applied by the ancients to Jupiter. THUN'DEROUS, a. *-ėr-ŭs,* thunder-like; loud-sounding; rumbling; in *OE.,* producing thunder. THUNDER-BLAST or -CLAP, a sudden burst or peal of thunder. THUNDER-BOLT, a shaft of lightning; a familiar name for belemnites; one who acts suddenly and with resistless force or fury; anything sudden and startling, as intelligence; a dreadful threat or denunciation: in *her.,* a bearing borrowed from classical mythology, consisting of a twisted bar in pale inflamed at each end, surmounting two jagged darts in saltire between two wings displayed with streams of fire. THUNDER-CLOUD, a dark cloud which produces lightning and thunder. THUNDERHEAD, n. *thŭn'dėr-hĕd,* a great mass of rounded cloud, often called a wool-pack, frequently seen floating in the atmosphere in the summer, defined meteorologically as a cumulo-nimbus cloud. THUNDER-SHOWER, sudden and heavy rain during thunder. THUNDER-STONE, a variety of crystalline iron pyrites; a belemnite. THUNDER-STORM, storm accompanied by thunder and lightning (see STORMS: LIGHTNING). THUNDER-STRUCK, a. struck by lightning; greatly astonished; struck dumb by something startling and surprising.

THUNDER-BIRD: an imaginary bird occurring in the mythology of races of low culture, and personifying thunder or its cause. Among the Caribs, Brazilians, Algonkins and various other North American Indians and among the Karens of Siam, the South African Bechuanas and Basutos, and other aborigines, there are legends of a flapping or flashing thunder-bird, which seem to translate into myth the thought of thunder and lightning descending from the upper regions of the air, the home of the eagle and the vulture.

THUNDERING LEGION: a name given to a Roman legion in the time of the Emperor Aurelius. After the expulsion of the Marcomanni and Quadi from Hungary, the Emperor Marcus Aurelius, pursuing these German tribes with a detachment of his forces (174 A.D.), was shut up in a valley surrounded on every side by high mountains. To those who were thus cut off from the main body of the army the heat and the want of water were no less dangerous than the attacks of the enemy. In this crisis a sudden shower of rain re-animated the Roman soldiers. At the same time a storm of hail, at-

tended with thunder, assailed the enemy, who were now easily repulsed and conquered. According to Dio Cassius the miracle was wrought by an Egyptian sorcerer in the train of the emperor; according to Capitolinus it was the effect of the emperor's prayers; but according to Tertullian and Eusebius it was brought about by the prayers of the Christians in his army.

THURGAU, *tôr'gow*, Switzerland: a canton at the northeast, with an area of almost 388 square miles. Unlike most Swiss cantons it has no high elevations, but a diversified surface, most of which is productive. It belongs to the Rhine basin and is chiefly watered by the Thur and affluents. There are extensive forests, and the arable lands yield a limited amount of grain and potatoes and grapes—fruit is abundant. Manufactures consist of linen and hempen cloth, ribbons, lace, hosiery, muslin, buttons, and wooden articles. There is considerable trade, owing partly to Lake Constance and the Rhine on its borders. The canton was organized in 1798, although it had been in possession of the Swiss from 1460. Prior to that time it belonged to the House of Hapsburg. Pop. (1900) 113,110.

THURIBLE, n. *thū'rĭ-bl* [L. *thurib'ŭlum*, a censer to burn incense in—from *thūs*, frankincense; *thūris*, of frankincense]: a Censer.

THURIFEROUS, a. *thū-rĭf'ėr-ŭs* [L. *thūs*, franklincense, *thūris*, of frankincense; *fero*, I bear]: producing or bearing frankincense. THURIFER, n. *thū'rĭ-fėr*, one who carries the thurible; the attendant in the Roman Catholic Church, at solemn mass, vespers, and other solemn ceremonies, whose duty it is to carry the *thurible*, or incense-vessel, and either to minister Incense (q.v.) himself or to present the thurible to be used for that purpose by the officiating priest. The office of thurifer is one of those belonging to the Minor Order of *Acolyte* (see ORDERS). THURIFICATION, n. *thū'rĭ-fĭ-kā'shŭn* [L. *facĭō*, I make]: the act of fuming with or burning incense. THU'RIFY, v. *-fī*, to cense.

THÜRINGER-WALD, *tü'rĭng-ėr-vâlt* (Forest of Thuringia): a considerable mountain range of central Germany, extending s.e. from the junction of the rivers Werra and Horsel, near Eisenach, to n. Bavaria, where it joins the Frankenwald, a ramification of the Fichtelgebirge; total length, about 50 m. Its highest summits (Gross-Beerberg, Schneekopf, Inselsberg, and Finsterberg) range from nearly 3,000 ft. to about 3,200 ft. The mountains are mostly of granite, porphyry, and argillaceous schists, abounding in metallic veins, among which iron ore is most conspicuous, though many others are found; and auriferous sands occur in some of the rivers which have their source here. The Thüringer-Wald is parcelled among the states of Weimar, Meiningen,

Coburg-Gotha, Prussia, Schwarzburg, Reuss, and Altenburg.

THURINGIA, *thū-rĭn′jĭ-a* (Ger. *Thüringen, tü′rĭng-ĕn*): territorial name still borne by that part of Upper Saxony generally bounded by the Werra, the Saale, and the Harz Mts., though it has no longer any political significance.

THURL, n. *thėrl* [AS. *thyrel*, a hole, an aperture (see THIRL 1)]: a short communication between adits in mines; a long adit in a coal-pit.

THURLOW, *thėr′lō* (EDWARD THURLOW), Lord: English lawyer: 1732-1806, Sep. 12; b. at Little Bracon-Ash, Norfolk. His father, a clergyman, sent him to school at Canterbury, where he obtained a sound knowledge of the Latin and Greek classics. Thence he proceeded to Cambridge 1748; but, for a breach of discipline, was compelled to leave the university 1751 without a degree. He became a student of the Inner Temple, and was called to the bar 1754. He was a fellow-pupil, in a solicitor's office, with the poet Cowper, and still affected idleness, though, in reality, he worked hard to make himself a good lawyer. His lofty stature, strongly marked features, dark eyes, bushy eyebrows, and look of self-possession and wisdom caused him to be credited with qualifications which he did not possess. He had powers, however, and they brought him early success at the bar. An accidental meeting, at a coffee-house, with the Scotch solicitors in the great Douglas case, led to his employment in it as junior counsel, and to his acquaintance with the members of the Douglas family. It was one of them, the Duchess of Queensberry, who, by her influence with Lord Bute, obtained for Thurlow 1761 the rank of king's counsel. Afterward his reputation was heightened by his speech in the Douglas case—the greatest effort of his life. In 1768 he was returned for Tamworth, and became a zealous supporter of Lord North. When, in 1771, he was appointed solicitor-gen., he attracted the special notice of George III. by his zeal in supporting the policy of the government toward the American colonies. In 1778 he was raised to the woolsack; and such was his influence with the king, that he was allowed, contrary to all precedent, to retain the office under the Rockingham administration, causing great embarrassment by opposing all the measures brought in by that government. Under the coalition ministry, he was compelled to retire; but he was restored as chancellor when Pitt came to power. For a time he supported the govt.; but relying again on the support of the king, he once more began to give trouble, and ventured to oppose the measures that his colleagues brought forward. Pitt then intimated that either he or Thurlow must retire; and the king, without hesitation, consented to his removal (1792).

THURMAN, *thėr'man*, ALLEN GRANBERY: 1813, Nov. 13—1885, Dec. 12: b. Lynchburg, Va. He settled with his parents in Chillicothe, O., 1819: after 1853 he resided in Columbus, O. He was employed by a land-surveyor at the age of 18 yrs., and at 21 was private sec. to the gov. of O.; was admitted to the bar 1835; was elected member of congress 1845; declined a renomination; was chosen judge of the state supreme court 1851, retiring 1856. In the canvass for the governorship (1867) he was defeated by Rutherford B. Hayes, but became U. S. senator 1869, Mar. 4, and was his own successor 1874–81. In the senate T. was the leader of the democratic party, and won the respect of his political opponents. He was the democratic candidate for the vice-presidency 1888, but was not elected. In the senate T. was author of the act to enforce compliance on the part of the Pacific r.r. companies with the terms of their obligations to the federal govt.—the 'Thurman Act.'

THURSBY, *thėrz'bĭ*, EMMA CECILIA: prima donna: b. Brooklyn, N. Y., 1857, Feb. 21. Studied music under Julius Meyer, Achille Errani, Erminia Rudersdorff, Lamperti, and Maurice Strakosch. Part of her musical education was received in Italy. On her return from Europe she sang in the Plymouth Church, Brooklyn, and at the Broadway Tabernacle. She traveled with Gilmore and toured the U. S. and Canada with Strakosch. In 1878 she went to England, touring that country and Europe. She also toured the U. S. with the Thomas Orchestra. In 1903 she gave concerts in China and Japan.

THURSDAY, n. *thėrz'dā* [AS. *thunres-dæg*, the Thunderer's day: Dan. and Sw. *torsdag;* Icel. *thorsdagr*, Thor's day, after the Scand. *Thor*, the god of thunder]: the fifth day of the week.

THURSO, *thėr'sō*: burgh of barony, seaport, and market-town on the n. coast of Caithness, Scotland, 21 m. n.w. of Wick. It is irregularly built, but has two handsome churches. T. Castle, e. of the town, is a fine venerable structure. The harbor is safe for small vessels. Pop. (1881) 4,055, (1891) 3,936.

THURSTON, *thėrs'ton*, ROBERT HENRY: mech. engineer: b. Providence, R. I., 1839, Oct. 25; d. 1903. He acquired practical knowledge of mechanical engineering in the work-shop, and then took a scientific course in Brown Univ. He entered the navy as third asst. engineer 1861, and during the war served on different vessels in the n. and s. Atlantic squadrons; was asst.prof. of nat. and experimental philosophy in the Annapolis Naval School 1865–70; resigned from the navy 1872, and then was prof. of mechanical engineering in Stevens Institute, Hoboken, N. J., till 1885, when he was appointed director of Sibley College in Cornell Univ. T. served on many important govt. commissions, and was pres. of the Amer. Institute of Mechanical Engineers. He was inventor of a magnesian lamp, automatic recording testing-machine, and many other devices. He was author of nearly 300 essays and papers on technological subjects and wrote several volumes, among them a *History of the Steam-engine.*

THUS, ad *thŭs* [AS. *thus;* Dut. *dus,* thus]: in this way or on this wise, referring to something present or under consideration, or to something just said, done, or referred to, or to something now to be indicated; to this degree or extent; so; consequently.

THUS, n. *thŭs* [L. *thūs,* frankincense]: the resin of the Norway or spruce fir, the *Abĭēs excel'sa,* ord. *Conif'ĕræ.*

THUYA: see THUJA, under THUITES.

THWACK, n. *thwăk* [imitative of the sound of blows: Icel. *thykkr,* a thwack]: a smart blow with something blunt and heavy, as with a stick: V. to strike with something blunt and heavy: to beat or thump; to thrash. THWACK'ING, imp. THWACKED, pp. *thwăkt.*

THWART, a. *thwawrt* [Icel. *thvera,* to slant: Icel. *thwerr;* AS. *thweorh;* Ger. *zwerch,* cross, awry: Dut. *dwars,* cross]: lying across or crosswise; transverse: in *OE.,* perverse: inconvenient: V. to lie or come across the direction of; to cross, as a purpose; to oppose; to frustrate or defeat: N. the seat or bench of a boat on which the rowers sit, placed athwart the boat: AD. in *OE.,* obliquely; transversely: PREP. across; athwart. THWART'ING, imp.: ADJ. opposing; crossing: N. the act of one who or that which thwarts; the act of crossing or opposing. THWART'ED, pp. THWART'ER, n. *-ẽr,* one who thwarts. THWART'INGLY, ad. *-ĭng-lĭ.* THWART'LY, ad. *-lĭ,* crosswise.—SYN. of 'thwart, v.': to oppose; contravene; resist; withstand.

THWING, CHARLES FRANKLIN, D.D.: educator and minister: b. New Sharon, Me., 1853, Nov. 9. He graduated at Harvard Coll. 1876, and at Andover Theol. Sem. 1879; was pastor of a Congl. church at Cambridge, Mass., 1878–86; Minneapolis, Minn., 1886–90; and pres. Western Reserve Univ. since 1890. He is assoc. editor of the *Bibliotheca Sacra.* Among his published works are: *American Colleges: their Students and Work; The Reading of Books; American Colleges: their Students and Work; College Administration;* and *'If I Were a College Student,*

THY, pron. *thī* [a form of THINE]: of thee, or belonging to thee; possessive of the pronoun *thou,* used only in solemn or grave style, *your,* the second person plural, being used in ordinary speech. THYSELF', reciprocal pron.—from *thy* and *self.*

THYINE-WOOD, n. *thī'ĭn-wûd* [Gr. *thuia,* a tree producing an aromatic gum—from *thuein,* to burn incense]: a precious wood mentioned in Rev. xviii. 12, and supposed to be the wood formerly called *thuja,* known to the Romans by a name signifying *citron-wood.*

THYLACINE, n. *thī'lă-sĭn* [Gr. *thulăkos,* a pouch; *kuōn,* a dog]: carnivorous marsupial animal of the genus *Thylacinus;* the dog-faced opossum or native tiger of Tasmania. The tail is long and tapering. Only one species is known (*T. cynocephalus* or *Harrisii*), native of mountainous parts of Tasmania, where it inhabits the wildest glens, but issues to prey on the sheep of the colonists, by whom it is commonly called the wolf, or tiger-wolf. It is of the size of a large dog, very active and fierce.

THYME, n. *tīm* [F. *thym*—from L. *thymus;* Gr. *thumos,* thyme: It. *timo*]: a common aromatic herb of the genus *Thymus,* nat. order *Labiatæ;* having a two-lipped calyx, and four diverging stamens. COMMON THYME (*T. vulgaris*) is 6-10 inches high, with narrow, almost linear leaves, and whitish or reddish flowers, in separate whorls, six in a whorl: it is common on dry hills in s. Europe, and is cultivated in gardens, for its fragrance.—WILD THYME (*T. Serpyllum*) has a procumbent stem with many branches, 2-3 ft. long, oval leaves and purplish flowers, arranged in whorls united in a head: it is abundant on hills and mountains in all parts of Europe and n. Asia, and cultivated in American gardens more than the common thyme, from which it differs in being less upright, bushy, and pale. It is less fragrant than common thyme, but both species contain an aromatic essential oil. The flowering branches (*Herba Thymi* and *Herba Serpylli*) are used in medicine as a powerful stimulant, and those of common thyme are used also for flavoring in cookery.—The LEMON THYME, or Lemon-scented thyme of gardens, is regarded as a variety of *T. Serpyllum.* It is generally of still lower growth than the common garden thyme.—The Basil-thyme (*Calamintha Nepeta*) with round-ovate crenate leaves, is naturalized from Europe in Virginia and southward.—No species of thyme is indigenous in America. THYMY, a. *tīm'ĭ,* abounding with thyme; fragrant with thyme.

THYMELEACEÆ, *tī-mē-lē-ā'sē-ē:* natural order of exogenous plants, of which the Mezereon and Spurge Laurel (see DAPHNE) are familiar examples. This order consists chiefly of shrubs, with a few herbaceous plants, and contains about 300 species, natives chiefly of warmer temperate countries. The leaves are undivided. The perianth is inferior, tubular, colored, 4-cleft or rarely 5-cleft, sometimes with scales in the orifice. The stamens are perigynous, often eight, sometimes four, less frequently two. The ovary is one-celled, and the fruit one-seeded, either nut-like or a drupe. The bark is generally fibrous and tough. That of *Gnidia daphnoides* is used in Madagascar for ropes, and that of *Lagetta lintearia,* or Lace-bark, in the W. Indies for whips. The bark of some species of *Daphne* and nearly allied genera is made into paper in the East: see DAPHNE. Poisonous properties prevail in the order. The bark is in general very caustic, and that of some species is used as a vesicatory, and for other medicinal purposes.

THYMIC, a. *thī'mĭk:* of or pertaining to the thymus gland. THYMIC ASTHMA. See THYMUS.

THYMOL, in chemistry, $C_{10}H_{13}.OH$, a colorless crystalline substance obtained from the oil of thyme. Often called thyme camphor. Its chemical nature is analogous to that of phenol, or carbolic acid, though it has but lit-

tle of the caustic properties of that body. It crystallizes in plates, is almost insoluble in water, soluble in alcohol, melts at 44° C., and is very easily attacked by many chemical agents. It has a thyme-like odor and is used as an antiseptic and disinfectant. Iodine and caustic potash convert it into di-iodo-thymol, which is the well-known antiseptic aristol.

THYMUS, n. *thī'mŭs* [Gr. *thumos*, thyme, a fleshy excrescence on the skin, so called from its likeness to a bunch of thyme-flower]: temporary gland existing at the lower part of the neck in children, and in the young of various animals: called also Thymus gland. It is one of those structures which, like the spleen, suprarenal capsules, and thyroid gland, are classed with the ductless glands. It is a temporary organ, whose greatest development and functional activity in relation to the rest of the body are manifested in the human infant soon after birth—this rapid growth, however, soon subsiding into a growth which merely keeps its proportion to the rest of the body; but it continues till the age of puberty. After several years it gradually assumes, in well-nourished persons, the characters of a mass of fat. When its growth is most active, the thymus gland is found to consist of two lateral lobes in contact along the middle line, extending from the lower border of the thyroid gland to the cartilage of the fourth rib, and covered by the sternum and by the margins of the muscles passing upward from the top of that bone. It is of pinkish gray color, soft and lobulated on its surfaces; and has been shown to consist of an assemblage of hollow glandular lobules, united by connective tissue, all their cavities communicating with a central reservoir or main canal without outlet. The thymus is about two inches in length, one and a half in breadth, and four lines thick, and at birth it weighs about half an ounce. Its exact uses are unknown; but like the other ductless or vascular glands, it doubtless has some important part in metabolism.

The only disease of this structure requiring notice is hypertrophy—which occasionally induces sudden dyspnœa (breathlessness) in children, called *thymic asthma*. The disease is known under various other names, as *Laryngismus stridulus, spasmodic croup,* and *child-crowing*. This *bastard croup,* as Dr. Watson calls it, is far more common than true croup, and is very liable to be confounded with it. 'In their most obvious symptoms, the two affections are much alike. The broad and essential difference between them is the absence in the spurious disorder of inflammation and of fever, and consequently of any concrete or other effusion from the mucous membrane of the air-passages. The child is seized all of a sudden, roused perhaps from its sleep, or checked in the act of sucking, by a catch, or interruption of its breath-

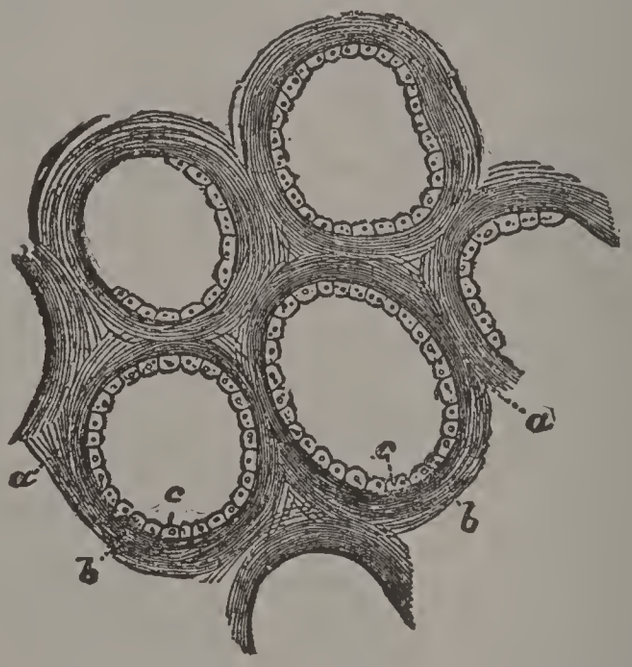
ing, more or less complete. It strives and struggles to inspire, but is apparently unable to do so; at length, the effort is successful, and the breath is drawn in with a shrill whistling or crowing sound, like that which characterizes the inspirations of croup or of hooping-cough, and depending, no doubt, upon the same cause—a narrowing (in this complaint, temporary) of the fissure of the glottis.'—*Lectures on the Principles and Practice of Physic,* 4th ed. I, 866. In severe cases, the countenance becomes livid, the eyes fixed, and there is entire suspension of the respiratory function for a while. The child makes vehement struggles to recover its breath, and at varied intervals, from a few seconds to a minute or longer, air is admitted through the glottis, now partially open; and this rush of air produces the characteristic sound. A fit of coughing or crying then often supervenes, and the attack terminates with some exhaustion. If, however, the glottis does not partially open, the child will die suffocated (in popular language, *in a fit*) at the end of two, or at most, three minutes. In association with these symptoms is often a contracted state of the flex or muscles of the thumb, fingers, toes, wrist, and ankle, giving to the foot an appearance like that of club-foot. It has been observed that there is frequent connection between child-crowing and certain other affections, as (1) tumefaction of the glands in the neck and chest, and entanglement of the pneumogastric nerve or its branches among these glands; (2) painful dentition, which is apt to produce glandular swellings of the neck; (3) excoriations behind the ears, and inflamed and irritable scalp, which also occasion enlargement of the glands. The nerves passing from the enlarged gland to the nervous centre convey the sensation of irritation; and the inferior laryngeal nerve, which supplies nearly all the muscles of the larynx, acts on the efferent or motor nerve, and excites spasmodic contraction of the muscles closing the aperture of the glottis. Thus the phenomena are those of Reflex Action.

During the paroxysm, the warm bath may be tried, if it can be made ready a once; and the more accessible application of hot fomentations to the throat, by means of a large sponge, is often serviceable. The muscles sometimes relax when cold water is freely sprinkled over the chest and face, and these simultaneous applications of hot and cold water are not incompatible. Subsequent general treatment must depend on the exciting cause, on the painful dentition, the eruption of the head, etc. The state of the bowels and of the skin must always be carefully regulated, and change of air is always advisable. Phosphate of lime, in doses of five to ten grains, three times a day, administered in chalk mixture, has been recommended.

THYRO-, *thī′rō,* or THYREO-, *thī′rĕ-ō* [Gr. *thurĕŏs,* a shield]: a prefix in anatomical terms, implying connec-

tion with the thyroid cartilage. THY'ROID, a. *-royd* [Gr. *eidos*, resemblance]: in *anat.*, shield-shaped, applied (1) to one of the cartilages of the larynx from its shield-like form; and (2) to a glandular body lying in front of this cartilage, or the arteries supplying the part (see THYROID BODY).

THYROID BODY, *thī'royd*, or THYROID GLAND: one of the ductless or vascular glands, at the upper part of the trachea; consisting of two lateral lobes, one on each side of this canal, and connected by a narrow transverse portion at the lower third, called the isthmus. It is of brownish-red color; and its normal weight is about an ounce, but it occasionally becomes enormously enlarged, constituting the disease called bronchocele or Goitre (q.v.). Each lobe is somewhat conical, and is about two inches long, and three-quarters of an inch broad. The thyroid body consists of an aggregation of closed vesicles (*b*, *b*, in fig.), which seem to be furnished with a true



Group of Gland-vesicles from the Thyroid Gland of a child: *a*, connective tissue; *b*, membrane of the vesicles; *c*, epithelial cells.

limitary membrane, therefore to be real gland vesicles embedded in a stroma (*aa*) of connective tissue, and not communicating with any common reservoir. These bodies vary in diameter in the human subject from $\frac{1}{2000}$ to $\frac{1}{85}$ of an inch; and they contain an albuminoid plasma, either faintly granular or of somewhat oily aspect, amid which are a number of corpuscles, the greater part in the condition of nuclei, while some have advanced to that of cells. The thyroid body is abundantly supplied with blood by the superior and inferior thyroid arteries, which continue subdividing, till they ultimately form a very minute capillary plexus on the limitary membrane of the vesicles. This body, like the thymus and sup-

rarenal capsules, is relatively larger in the fetus and during infancy than in after-life.

The secretion of the thyroid gland, called an internal secretion, since it is taken up directly by the blood and is not discharged through a duct (like that of the digestive glands, for instance), is essential to a proper performance of the nutritive changes in the body. Its absence, in consequence of atrophy or disease of the thyroid body, is the direct cause of cretinism in the infant and of myxedema in the adult (see those titles).

THYRSUS, n. *thĕr'sŭs,* or THYRSE, n. *thĕrs* [L. *thyrsus;* Gr. *thursos,* a stalk, a stem, a staff entwined with ivy and vine-shoots]: in *anc. Greece,* a wand (sometimes wreathed in ivy and vine-leaves) with a pine-cone at the top, carried by the devotees of Bacchus; in *bot.,* a species of inflorescence; a compact panicle, as in the lilac, like a bunch of grapes.

THYSANURA, or THYSANOURA, n. plu. *thĭs'ă-nū'ră* [Gr. *thusanos,* a fringe; *oura,* a tail]: order of apterous or wingless insects of small size, and which undergo no metamorphoses. They are furnished with peculiar organs, either along their sides or at the extremity of the abdomen, which, as well as the legs, are used for locomotion. The common names are Spring-tails or Bristle-tails, and some of them, of fish-shape and satin lustre, occasionally found around kitchen-sinks, are called fish-worms. If the *Collembola,* including Podura (q.v.), are excluded, the order has the families *Japygidæ, Campodidæ,* and *Lepismatidæ* (see LEPISMA). The *Lepismidæ* have an elongated body, covered with small shining silvery scales. The abdomen is furnished on each side with a series of movable appendages; it has also at its extremity a compressed appendage of two pieces, and three jointed bristles, used in leaping. The *Lepismidæ* inhabit dark and moist places; many of them often in the interior of houses. THYS'ANUROUS, a. *-ă-nū'rŭs,* having fringed tails.

THYSELF. See under THY.

TI, *tē* (*Corāyline Ti,* formerly *Drācœna terminalis*): plant of nat. order *Liliaceæ,* nearly allied to the Dragon Tree. See DRAGON'S BLOOD. It is found in s.e. Asia, Eastern archipelago, Sandwich Islands, and many other island groups of the Pacific Ocean. It attains a height of 10 or 12 ft., sometimes more, with a tree-like form, lanceolate leaves of a reddish hue, and branching panicles. The fruit is a three-celled and three-seeded berry. The leaves afford food for cattle, and form durable thatch for houses. Their fibres are sometimes made into cloth. The plant is most valuable, however, for its root, which is very large, and when raw is hard, fibrous, and almost insipid; but becomes soft and sweet when baked: it is very nutritious, and much used as food. Good sugar is made by evaporating its juice; the fermented juice is used as an intoxicating beverage, and a kind of ardent spirit is distilled from it.

TIAHUANUCO, *te-â-wâ-nô'ko:* detached elevation of the land (12,000 ft.) in Bolivia, on Lake Titicaca, about 40 m. n.w. of the city of La Paz. It appears to have been anciently an island, when the area of the lake was greater than it is now. On the summit are noteworthy tokens of former human occupation. Some of the structures seem to have been built on a pyramidal plan, and to have covered several acres; but the most remarkable are monolithic doorways, pillars, and statues of stone, elaborately sculptured in a style wholly different from any other remains of art yet found in America. One of these doorways is 10 ft. high, 13 ft. broad, with an opening 6 ft. 4 in. by 3 ft. 2 in. Its east front has a cornice, in the centre of which is a human figure of strange form, crowned with rays, interspersed with serpents with crested heads. On each side of this figure are three rows of square compartments, filled with human and other figures, of apparently symbolic design. The whole neighborhood is strewn with vast blocks of stone elaborately wrought, some of which measure 3 ft. in length by 18 ft. in width, and 6 ft. in thickness.

TIA'RA, PAPAL: the triple crown of the pope, considered symbolical of his temporal, as the keys are of his spiritual, authority. It is composed of a high cap of gold cloth, encircled by three coronets, with a mound and cross of gold on the top. From the cap hang two pendants, embroidered and fringed at the ends, and semée of crosses of gold. The original papal crown consisted of the cap alone, and was used first by Pope Damasus II. 1048. The cap was surrounded with a high coronet by Boniface VIII. 1295; the second coronet was added 1335 by Benedict XII.; the third by John XXIII. 1411.

TIARA, n. *tī-ā'rā,* or in poetry TIAR, n. *tī'âr* [L. and Gr. *tiāra,* a turban: It. *tiara:* F. *tiare*]: the lofty turban or ornamental head-dress of the anc. Persians; the mitre of the anc. Jewish high-priest; the pope's triple crown (see below); a diadem. TIA'RAED, a. *-rād,* possessing or wearing a tiara.

TIBALDI, *tē-bâl'dē,* PELLEGRINO: Italian painter and architect: b. Bologna 1532; d. Milan 1598. In 1547 he commenced his profound study of Michelangelo at Rome and painted for Cardinal Poggi, in his palace at Bologna, the *History of Ulysses.* When Caracci saw these pictures, in which the style of Michelangelo appeared in a softened and refined form, he pronounced Tibaldi *il Michelangelo Riformato*—an improved version of Michelangelo. He also decorated the chapel of Saint James for the Augustinians. Among his architectural works are the palace of Cardinal Borromeo at Pavia (1562); the Church of Saint Fidelas at Milan, and the new façade of the cathedral in that city. He likewise furnished Philip II. with the plan for the Escorial, and painted the ceiling of the library in that palace. Consult: Zanotti, *Le Pitture di Pellegrino Tibaldi* (1532).

THE BRIDGE OF SAN ANGELO, CROSSING THE TIBER

TIBER, *tī'bẽr:* chief river of central Italy, and the most famous in the peninsula; rising from two springs in a wood of beech-trees in a dell of the Tuscan Apennines (province Arezzo), about six m. n. of the village of Pieve-San-Stefana, lat. about 43° 45′ n. Its course to Perugia is s.s.e.; thence to Rome it flows s. in an irregular zigzag line; but when it enters the plain of the Campagna, it curves s.s.w., and enters the Mediterranean by two branches, which inclose the Isola Sacra. Total length about 212 m. The most notable towns on or near its banks are Perugia, Todi, Orvieto, Rome, and Ostia; and its chief affluents are the Nera (anc. *Nar*), and Teverone or Aniene (anc. *Anio*) from the left, and the Chiana from the right. In its upper course to Orvieto, it is rapid and turbid, and of difficult navigation. It is regularly navigable for boats of 50 tons to the confluence of the Nera, 100 m. from its mouth, and small steamers ascend to within 7 m. of that point. Wine, corn, charcoal, wood, and other produce from the interior are conveyed by the T. to Rome. Within the walls of Rome (q.v.), the width of the river is 300 ft., depth 12–18 ft. Of its two mouths, the n., the Fiumicino, is the channel of commerce; the s., the Fiumara, is useless for commercial purposes, owing to the accumulation of sand at its mouth. The T. is supplied mostly by turbid mountain torrents, whence its liability to sudden overflowings; even the oldest Roman myth, that of Romulus, being inseparably associated with an inundation. Its waters, too, are still discolored with yellow mud, as when Virgil described it—

Vorticibus rapidis et multa flavus arena.

TIBE'RIAS, Lake or Sea of: see Gennesaret, Sea of.

TIBERIUS, *tī-bē'rĭ-ŭs* (Tiberius Claudius Nero), second emperor of Rome: b.c. 42, Nov. 16—a.d. 37, Mar. 16 (reigned a.d. 14–37); b. on the Palatine Hill; son of Tiberius Claudius Nero, one of the active partizans of Pompey and Antony in the war of the second triumvirate, and of Livia, descendant of Appius Claudius Cæcus. The triumvir Octavianus Cæsar (afterward Emperor Augustus) having become enamored of Livia, the complaisant husband divorced her, and, though then pregnant with Drusus, she was immediately espoused by Octavianus b.c. 38. T., being now one of the imperial household, received a careful education; was allowed by Augustus the same public honors as those given to his nephew and grandsons; and, as well as his brother Drusus, was employed in active service at the head of the legions on the outposts of the empire. T. was at this time in favor with the emperor and the Roman people; and his praises as a military leader were loudly sounded, though the character of his opponents did not require from him very great warlike ability. At the command of Augustus, he unwillingly divorced his wife, Vipsania Agrippina, to marry the emperor's daughter Julia b.c. 11; but, disgusted at her open profligacy, he gladly accepted a command on the German frontier, and afterward (b.c. 6) retired to Rhodes, where he lived seven years, re-

turning after Julia's banishment to Pandataria. The death of two of Augustus's three grandsons paved the way for the adoption of T. and of the third grandson, Agrippa Postumus, by the emperor, and for the appointment of T. as heir to the throne; Agrippa being, apart from his youth, unfitted for the exercise of uncontrolled authority. Accordingly, T. ascended the throne A.D. 14: and, by his manly and graceful demeanor, prudence, and moderation, gave promise of a happy reign. His mild and benignant sway at first was doubtless due in part to the necessity of outbidding his popular nephew Germanicus (who was of Octavian blood by his mother's side) for public favor; but after his kinsman's death (A.D. 19), and the removal of all who were likely to put forth claims to the throne, T.'s character developed less favorable aspects. He had always been taciturn, reserved, gloomy, tenacious in purpose, jealous, and irresolute, though not cowardly, and almost devoid of sympathy and affection; and with the sceptre firmly in his grasp, the development of these qualities, with perhaps a clouding of his mind in his last ten years, produced a line of conduct which has by many writers been taken as indicating a monstrous wickedness and cruelty. During the life of his mother, however, T. at first left to her a large share in the government, and led a retired life: afterward he exercised a more active rule. The chief events of this part of his reign were the increase in number and amount of the taxes, the removal of all power from the people and the senate, and the institution of prosecutions for *læsa majestas*, the latter being only a convenient mode of removing all who incurred the displeasure of the emperor. After Livia's death A.D. 29, he resigned the whole real authority into the hands of Ælius Sejanus, Roman knight, and commander of the pretorian guards. His naturally suspicious and gloomy temper—doubtless embittered by the miserable state of his family life—was wrought upon by Sejanus, who was a man of great ability and resolution, and well knew how to maintain his ascendency over the emperor by pouring into his ear tales of conspiracy, and then allaying the imperial fears, and satisfying his own private enmities by the condemnation for *læsa majestas* of eminent Roman citizens. Nevertheless, the government in general was well and wisely administered; the provinces never were under better rule; strict economy, light taxation, and public security were achieved. The sufferers from tyranny were the wealthy and eminent men of Rome. In A.D. 27 T. retired to the island of Capri, leaving Sejanus, whom he made his coadjutor in government and equal in position, at the head of affairs: and from this period till the discovery of the ambitious aspirations of Sejanus, and his downfall A.D. 31, the Roman annals are crowded with proscriptions at Rome, and infamous excesses at Capri. Sejanus's successor, Macro, had all his vices, and few or none of his talents: and so the state of affairs was even worse than before, the senate indorsing with accommodating promptitude every order, however tyrannical, of the emperor or his confidant.—T. died as Misenum.

TIBET.

TIBET, or THIBET, *tĭb'ĕt* or *tĭ-bĕt'*, or TUBET, *tûb'ĕt*: European name of a country in central Asia; bounded n. by Mongolia, e. by China, s. and w. by Hindustan (native name *Bod* or *Bodyul*, the land of Bod); 600,000 to 800,000 sq. m. The n.e. part is scarcely known.—Pop. estimated 6,000,000.

Surface.—From an elevated tract at the w. extremity of T., where the Hindu-Kush and Pamir highlands meet, the mountain-system of the Kuenlun runs e., and the greater chain of the Himalaya s.e., inclosing in the angle between them the Tibetan table-land, which extends e. to the frontier of China. Although T. is described as a table-land by geographers, its suface is traversed by mountain-chains, which, near its w. and e. frontiers, interlace and ramify in a complicated manner. On the s. border, the height of the plateau through which the Sanpu runs, from a point near its source to H'lassa, was carefully ascertained by barometrical observations 1866. Along the great route from H'lassa to Gartok, in the basin of the Indus, for 800 m., the average elevation is 13,500 ft. Several stages of the journey along the route were above 16,000 ft.; only one sank to 11,000. N. and e. of this elevated tract, the plains of T. are supposed to descend; but accurate observations are lacking. The Himalaya, 20 summits of which are higher than the loftiest of the Andes, stand out from the plateau, and are connected with it only by ridges of lesser elevation. In general, the descent from T. on the s. is by three gradations, the first very abrupt. The mountain-roads by which T. is entered from India, pass through deep ravines cut by the streams in the mountains, and present the wildest and grandest scenes described by travellers.

The mountains which rise from the table-land divide T. into several natural regions. The Karakorum range, parallel to the Himalaya, forms with them a great valley, drained on the w. by the tributaries of the Indus, and on the e. by the Sanpu. To the whole basin of the Indus n. of the Himalaya, the name Little Tibet is sometimes given; but generally the upper basin is known as Ngari, the middle basin as Ladak (q.v.), or Middle Tibet; and the lower as Bultistan, or Lower Tibet. The countries drained by the Sanpu are described as T. proper, which is in turn divided into Dsang, the dist. of the Upper Sanpu, and Wei, surrounding H'lassa, the dist. of the Lower Sanpu. Further e., the tract drained by the tributaries of the Yang-tze-kiang, in which are Lithang and Bathang, is known as Kham. N. of the basin of the Sanpu, lies another region, a great elevated desert, called Khor on the w., and Katchi on the e.; and at the n.e. extremity of T. is a hilly tract, in which the Hoang-ho takes its rise, and in the centre of which is Lake Ko-ko-nor. The provisional name given to the tract is the country of the Ko-ko-nor.

Geology.—The geology of T. is little known except on the s. and w. frontier. The highest part of the Himalaya consists of granites and crystalline strata, and in the neighborhood of Lake Manasarowar, of volcanic rocks. On the

table-land, the strata belong to the most recent Tertiary epoch (the Pleistocene). They lie horizontally as they were deposited, and seem to have been lifted up in one unbroken cake to their present prodigious elevation. T. is believed to abound with silver, copper, and tin, but the absence of fuel renders its mineral wealth unavailable. Gold is found in considerable quantities; and salt, sulphur, borax, and nitre abound.

Climate.—T. lies between the latitude of Naples and Cairo, and might be supposed to enjoy a similar climate. But its great elevation renders it excessively cold during the winter, when its climate resembles that of the arctic regions more than that of the zone to which it belongs. The mountains and the great plains between T. and the sea rob the winds of their moisture; hence another peculiarity of the climate is its excessive dryness. Timber never rots, but it breaks from brittleness; flesh exposed to the wind does not become putrid, but dries, and can be reduced to a powder. The air loses its conducting power; and persons dressed in sheepskins give out long electric sparks when they approach conducting substances. During winter, the winds are excessively high, and the weather-beaten rocks break into a dust, which mixes with the loose alluvial soil, and with it is blown about in blinding clouds. The limit of perpetual snow is from 16,000 to 18 000 ft. high on the Tibetan side of the Himalaya, while on the Indian or s. side it is in some places only 13,000—a fact attributed to the dryness and purity of the air above the table-land. The Tibetan glaciers, particularly in the mountain region of the w., are of enormous extent. Pastures and low bushes make their appearance at 18,544 ft. (2,800 ft. higher than Mont Blanc, and 1,279 ft. above the snow-line on the Andes near Quito). Below this level extends a country of bare and scanty pastures. Owing to the great dryness of the air, trees (the cedar and birch) are found in only a few scattered spots on the hills. In the great plains, the pursuits of the inhabitants are chiefly those of the pastoral tribes of the steppes of central Asia. In the valleys the soil is more productive; and fruit-trees, the vine, and the European grains are cultivated. The conditions of the climate render irrigation necessary, and the construction and maintenance of terraces along the slopes. This has given rise to a kind of agriculture characteristic of T., which demands skill and continuous labor, and which has called into existence an intelligent, strong, and hardy population. Among the productions of T. are barley, buckwheat, grapes, and all the European fruits.

Industry.—The Tibetans have made considerable progress in industrial arts. They are ingenious jewellers, and manufacture extensively fabrics of wool and goat's hair, Buddhist idols, etc. In spite of the inaccessible nature of the country, and the lack of good roads and bridges, the rivers being crossed by inflated skins, a great trade is carried on with the neighboring lowlands. That with China is conducted chiefly at Sinning, but partly at H'lassa, by caravans, the goods being conveyed on the backs of oxen,

mules, and horses. The raw produce of T. is exchanged for tea, or Chinese manufactures, and European cutlery. A great trade is carried on also with Nepaul and Bhotan, from which, in exchange for the produce of T., broadcloths and Indian manufactures are imported. From Turkestan the trade is no less important.

Language and Religion.—The language of the Tibetans, spoken also in Nepaul, and by the inhabitants of Bhotan, belongs to the monosyllabic or Chinese class: see PHILOLOGY. Tibetan is singularly free from dialects, from which it is judged to have spread rapidly in recent times. It has a copious literature, chiefly religious. The religion of the Tibetans is a kind of Buddhism: see LAMA. At the extreme w., in Bultistan, Mohammedanism prevails, which, having spread from Cashmere and Persia, and not from Turkestan, is Shiite. Some practices common, it is believed, to the earlier races of men, are said to survive among the Tibetans: the most remarkable is Polyandry (q.v.), brothers being allowed to have one wife in common.

Government.—Almost the whole of T. proper is now tributary to China. The government is to some extent, however, in the hands of a Buddhist hierarchy, the name of the chief priest being the Dalai-lama, and the second the Bogdo-lama. These spirittual and temporal princes rule in different parts of the country. There are Chinese soldiers in all the chief towns, and several years ago their number was said to be more than 60,000. The Chinese generals have entire control of the army, and direction of the most important temporal affairs. Commerce is in the hands of the government, and is closely watched, there being Chinese garrisons at all the chief passes.

There are several important towns in Tibet, of which H'lassa (q.v.) is the chief.

History.—The early history of T. is legendary. The first king, B.C. 113, was said to have been exposed in a copper box, and afterward found swimming in the Ganges. As early as the beginning of the 5th c. after Christ, a Buddhist missionary from Cashmere is said to have obtained in T. a footing for the doctrines of Buddha. In 821 T. was compelled to pay tribute to China. Early in the 10th c., King Dharma adopted Mohammedanism; but he was killed 925, and Buddhism was re-established. In the beginning of the 11th c., T. was split into several states, and its power declined. In the 12th and 13th c., the Chinese began to conquer e. T., which, however, did not become tributary to Peking till 1720, when it was placed under its present government. W. Tibet has been exposed to the inroads of the Turkish tribes more than to those of the Chinese. The former were, however, expelled from it by Aurungzebe in the 17th c., and then it was that Mohammedanism was introduced. In the early part of the 19th c., w. Tibet was annexed to the Sikh empire of Runjeet Singh: it now forms part of the territory of the maharajah of Cashmere.

For a long period, T. was known in Europe only from the accounts of Marco Polo and of the Jesuit missionaries,

travellers respectively of the 13th and 17th c. The English in India tried to establish friendly relations with the Tibetans in the 18th century and the country was visited in 1774 by George Boyle and in 1783 by Samuel Turner, both sent by Warren Hastings on missions to the Dalai-lama. But the English assistance given to the Nepalese invasion of T. in 1790 checked any friendly inclinations the Tibetans may have had, and in the 19th century the British had to resort to sending pundits, disguised as merchants, to explore the country and to take scientific observations. These pundits visited the great gold-fields of T., which were found to extend 1,000 m. s.e. of Ilchi, the mart from which the produce of the diggings is exported; and they furnished accurate and copious information about districts which no European had been allowed to enter. The journey of the pundit Nani Singh, 1874, 5, is one of the most important of the 19th century in geographical results. Others who partially explored Tibet were Manning (1812), Strachey (1849), the French Jesuits Huc and Gabet, the brothers Schlagintweit (1855–57), Przhevalski (1870–71. 1879, 1887), Bonvolot (1889), Bower (1890–91), Dutreuil de Rhins (1893–94), Littledale (1894), Sven Hedin (1894–97, 1899–1902), Landor (1897), and Kozloff (1901–02). In spite of all efforts on T.'s part to keep Europeans at a distance Russian and English designs in Central Asia make it impossible for her to maintain an isolated position. In 1903 difficulty arose regarding the observation of a treaty concluded in 1893 to settle frontier disputes between T. and Sikhim, and the British Indian government sent an envoy to discuss the matter with Chinese and Tibetan commissioners. The latter did not appear and the viceroy sent Col. Younghusband into Tibet with an armed escort. After the slaughter of Tibetan troops by English Maxims half way between the frontier and L'hasa, the British reached the capital in Aug. 1904, and signed a treaty with the Tibetans. The Dalai-lama fled at the British approach.

TIBIA, n. *tĭb'ĭ-ă*, [L. *tibĭa*, the shin-bone, a flute]: in *anat.*, the larger of the two bones of the lower leg, extending from the knee to the ankle, the other being the Fibula (q.v.); the shin-bone of man (see LEG, THE). TIB'IAL, a. *-ăl*, pertaining to or situated near the tibia.

TIBULLUS, *tī-bŭl'ŭs*, ALBIUS: Roman elegiac poet: about B.C. 54—abt. B.C. 19; of equestrian family (see EQUESTRIAN ORDER). We know nothing of his youth or education. From his equestrian ancestors he inherited an estate at Pedum, between Tibur and Prænestę, which, like the estates of Virgil and Horace, had been either wholly or partly confiscated in the civil wars. T., however, recovered part of his property, and spent on it the most of his short life. He was patronized by Messala, whom, B.C. 31, he accompanied into Aquitania to suppress a serious revolt. He was present at the battle of Atax, which gave the final blow to the insurgents; and he celebrates in a fine poetic strain his part in the campaign. Next year, Messala was sent to the East, and again T. accompanied him; but having been obliged from illness to stop at Corcyra,

he returned to Rome (B.C. 29). At this point the public life of T. ceases; thenceforth he applied himself to the study and composition of poetry. His Elegies, divided into four books, are mainly addressed to his mistresses, Delia, Nemesis, and Glycera, whose inconstancy or coldness he bewails in tender and exquisitely finished verses. The third book, however, is now believed to be the work not of T., but of an inferior poet; also the hexameter poem on Messala, with which the fourth book opens, is, from internal evidence, supposed to be by an inferior hand. Only the first book was published during the poet's lifetime. The character of T. was gentle, amiable, and winning. During life, he had the honor of being addressed in an ode and an epistle by Horace; after death, of being bewailed in an elegy of matchless beauty by Ovid.

TI'BUR: see TIVOLI.

TIC, n. *tĭk* [F. *tic*, a twitching]: a local and habitual convulsive motion of certain muscles, particularly of the face. TIC-DOULOUREUX n. *tĭk-dû-lû-rô'* [F. *douloureux*, painful]: a painful affection of a nerve, coming on in sudden attacks, usually in the head or face; neuralgia in the face—also simply called TIC (see NEURALGIA).

TICHBORNE TRI'AL, *tĭch'bėrn:* notable English law case, called for trial 1871, May 12, and closed 1872, Mar. 6. Roger Charles Tichborne, b. 1829, Jan. 5, belonged to an ancient family, and was heir (after his father) to the title and estate of Sir Edward Tichborne, his uncle. He was educated in France and at the Jesuit college of Stonyhurst; held a commission in the army 1849–52, but then resigned and went to sea. He was certainly in Valparaiso 1853, June; then crossed the continent to Rio, whence he sailed for New York in the ship *Bella*, which was lost at sea. Roger was then presumed to have deceased. His father, who succeeded to the baronetcy 1853, died 1862. Roger's mother, Lady Tichborne, hoping that her son might still be alive, advertised for him in English and Australian newspapers, 1865, and the following year her advertisement was answered by Thomas Castro, butcher, of Wagga Wagga, Australia, who declared himself to be her son, saved from the wreck of the *Bella*. On Lady Tichborne's invitation he sailed for Europe, 1866, and she joyfully acknowledged him as her son, but nearly all the rest of Sir Roger's kindred repudiated him. He brought suit against the trustees of the estate to recover his rights. Lady Tichborne died 1868, still believing Castro to be her son Roger. In the trial he was non-suited. The main points against 'the Claimant' were his ignorance of French (in which Roger was fluent), also of incidents in Roger's sojourn in France; the unlikeness of his handwriting to Roger's; the marked physical difference between the two; and Castro's neglect to draw on the large balances due him as Sir Roger and owner of his uncle's estates, when he had been in sore financial straits. The Claimant was then indicted and tried for perjury, convicted, and sentenced 1874, Feb. 28, to 14 years' penal servitude. He was liberated on ticket of leave 1884, Oct. 20.

TICHVIN, *tĭĕh-vĭn′:* town of Great Russia, govt. of Novgorod, 168 m. e.s.e. of St. Petersburg, on the Tichvinka, which, together with the canal of the same name, connects the Volga with the Baltic. It has numerous churches, but is best known for its monastery, which contains a 'thaumaturgical' or miracle-working image of the Virgin. The inhabitants are chiefly employed in the transit-trade by land and water. Pop. (1900) 7,000.

TICI'NO: river of Switzerland and n. Italy, rising on the s. slopes of Mt. St. Gothard, and flowing s. through Lake Maggiore, and s.s.e. through n. Italy to its junction with the Po, 4 m. below Pavia. Entire length about 120 m., 75 of which from Lake Maggiore, are navigable.

TICINO, *t -chē′nō*, or TESSIN, *tĕs-săng′:* most southern canton of Switzerland, bounded w. and s. by Italy, e. by Italy and the canton of Grisons; 1,082 sq. m. Its surface, forming a portion of the s. slope of the Alps, comprises lofty mountains in the north. The n. boundary between T. and the canton of Uri and Grisons is a range of the Lepontine Alps, rising in Mount St. Gothard (q.v.) about 12,000 ft. Offsets from the Lepontine and Rhætian Alps occupy the greater part of the canton. In the s., the country falls away into flats, and the scenery becomes Italian. The principal rivers are the Ticino (q.v.), by which nearly the whole canton is drained, and from which it is named. In the n., cattle-breeding and preparation of dairy produce are chief employments. South of the Alpine regions are elevated forest-clad districts; and further s., olive-yards and vineyards, corn-fields and plantations of figs, almonds, oranges, citrons, and pomegranates occur. Cattle, cheese, wine, fruits, and hay are exported. The n. part of Lake Maggiore, and almost the whole of Lake Lugano, are within the canton. Pop. (1900) 138,638.

TICK, n. *tĭk* [F. *tique;* Low Ger. *teke;* Ger. *zeeke*]: an arachnid, a parasite on sheep, dogs, etc. (see below); the *Meloph′ăgus ovīnus*, or sheep spider-fly, which burrows its forepart into the flesh or fat of the sheep: a small bean used for feeding horses, etc. TICK-SEED, a plant.

TICK, v. *tĭk* [imitative of the sound of light knocking: Dut. *tikken*, to pat, to touch: Low Ger. *tikk*, a light touch]: to touch lightly: make a small quick noise: to beat, or emit a slight recurring click, as a watch or clock: place a dot on, over, or against: N. a dot or small mark with the point of a pen; beat or recurring click, as of a watch. TICK′ING, imp. TICKED, pp. *tĭkt*. TICK′ER, n. *-ĕr*, in *slang*, a watch; a telegraphic instrument, especially one which records the prices of stocks. To TICK A THING OFF, to mark an item with the touch of a pen. ON TICK, on credit. TICK-TACK, the noise occasioned by two successive vibrations of the pendulum of a clock.

TICK, n. *tĭk* [Dut. *tijk;* Ger. *zieche,* a tick or covering of a bed: mid. L. *techa,* a linen case, a corruption of L. *thēca;* Gr. *thēkē,* a case]: cover or case of a bed which contains the feathers, wool, or other stuffing; the strong cloth of which such cases or covers are made. TICKEN, n. *tĭk'n,* or TICK'ING, n. *-ĭng,* the strong cloth, formerly of linen, now largely of cotton, used for bed-ticks.

TICK: popular name of a great number of *Acarides* (see ACARUS: also MITE), forming a section called *Suctoria,* having the mouth in the form of a sucker, with no apparent mandibles. They live by sucking the juices of plants and animals. Some are aquatic. The Harvest-bug (q.v.) is a well-known example of the suctorial *Acarides:* it belongs to a family called *Leptidæ.* The name T. is given particularly to the family *Ixodidæ.* They abound in almost all parts of the world, but chiefly in warm countries, in which they are very troublesome. Many live in woods, attached to branches, but are ready to attach themselves to animals, which sometimes suffer greatly from their numbers, their blood-sucking powers, and the inflammation which they cause. The Tampan (q.v.) is a very troublesome T. of s. Africa. The Carapata of Brazil is scarcely less annoying: it infests dry bushy places, clusters of many hundreds being found clinging to very slender twigs, and they instantly transfer themselves to any horse, ox, or other quadruped which comes in contact with them, burying their serrated suckers in its skin, so that they cannot be withdrawn without considerable force. If not taken off, they increase in size, till they become as large as a horse-bean, or even larger. Whole herds of cattle sometimes perish from the exhaustion which they cause. Wet weather, however, soon kills them, and an animal made to swim across a river is almost freed from them at once. Travellers in interior Brazil are sometimes obliged to pick off hundreds before retiring for the night.—The Cattle T. is *Ixodes bovis.*—The Dog T. (*Ixodes ricinus*) of Europe attaches itself to dogs, oxen, and other animals, sometimes even to man. It is in form and size like a grain of linseed, oval, shining, reddish, with a pale margin. The body swells to the size of a small horse-bean after the T. has attached itself to an animal, and the wound is attended with much inflammation and pain. Tortoises have ticks peculiar to them, which adhere to their neck, and by the thickness of their leathery coat, are preserved from being crushed when the head is retracted. The 'Sheep-tick' is not a tick (see SHEEP), nor the Horse-tick and Bird-ticks; all these belong to the order *Diptera.*

TICKET, n. *tĭk'ĕt* [F. *étiquette,* a little note or ticket]: a mark stuck on the outside of anything to give notice of something concerning it; a label; a slip of paper bearing a mark, number, etc.; a card or slip of paper serving as a token or certificate of a right, a debt, or the like; small card inscribed and numbered, admitting to a place of amusement, or to travel on a railway, steamboat, etc.; in the United States, list of candidates nominated or put forward by a party for election; an account stuck up; a score, now re-

duced to *tick*, as to buy on *ticket*, that is, on *tick* or credit: now obsolete in this sense: V. to distinguish by a ticket; to attach a ticket or label to. TICK'ETING, imp. TICK'ETED, pp. TICKET-PORTER, a porter licensed to carry packages, luggage, etc., and wearing a ticket or badge as evidence of his right. TICKET OF LEAVE, a license to be at large, granted to a well-behaved convict before the expiry of his sentence, but liable to be forfeited on misconduct (see below). TICKET-WRITER, one who writes and paints show-cards for shop-windows. THE TICKET, in *slang*, the right or correct thing.

TICKET OF LEAVE: originally a kind of permit to be at large given to convicts transported to Australia, after a certain period of their sentences had expired, but requiring the convict who held it to remain within a particular district. The term was afterward popularly applied to the kind of document, called technically an 'order of license,' which sets a convict at large in the Brit. empire before the expiry of his sentence. The occasion of its first use was when, after 1840, the colonies, one after another, refused to receive convicts. If those sentenced to transportation were kept in prison in Britain for the whole period of sentence, its severity would be greatly increased; hence, by way of compensation to the convicts not taken abroad, part of their sentence was remitted. When penal servitude was substituted for transportation the partial remission was made systematic, as an inducement to good conduct and industry. Under the act of 1864, the period of remission which may thus be gained is for men about a fourth, and for women about a third, of the whole sentence. See CONVICT: PRISONS—PRISON DISCIPLINE.

TICK'ING: see TICK: TICKEN.

TICKLE, v. *tĭk'kl* [from Eng. *tick*, to mark with dots: Low Ger. *ticken*, to touch lightly: Scot. *kittle;* Dut. *kittelen;* Ger. *kitzeln*, to tickle]: to touch lightly, as some sensitive part of the skin, so as to cause a peculiar thrilling sensation which excites laughter in most persons; to please by slight gratification; to excite the sensation of tickling; to feel tickling: ADJ. in *OE.*, ticklish; uncertain. TIC'KLING, imp. *-klĭng:* N. the peculiar sensation produced by titillation or slight touches on some sensitive part. TICKLED, pp. *tĭk'kld.* TIC'KLER, n. *-klėr*, one who tickles; *familiarly*, anything difficult or insoluble; a puzzling thing; a memorandum-book kept to tickle or refresh the memory. TIC'KLISH, a. *-klĭsh*, easily tickled; easily moved or affected; tottering; nice; critical; difficult. TIC'KLISHLY, ad. *-lĭ.* TIC'KLISHNESS, n. *-nĕs*, the state or quality of being very sensitive; criticalness of state.

TICKNOR, *tĭk'nėr*, GEORGE: scholar and author: 1791, Aug. 1—1871, Jan. 26; b. Boston; son of Elisha T., who had been principal of a public school, and who originated the free primary school system of Boston, and founded the first savings-bank in New England. He was educated at Dartmouth College, admitted to the bar 1813, but applied himself to literature. From 1815, he spent four years in

Europe, at Göttingen, Rome, Madrid, Paris, Edinburgh, and London, where his cultured mind and attractive nature opened to him the acquaintance of the most distinguished men of letters. Returning to America, he became prof. of French and Spanish languages and literature in Harvard Univ. In 1835, resigning his professorship to Henry W. Longfellow, he went with his family to Europe, where he remained three years, collecting materials for his *History of Spanish Literature* (New York, 1849, 3 vols. 8vo), an exhaustive and admirable work on a subject then new in Europe as well as America, which has been translated into Spanish and German. T. edited *The Remains of Nathaniel Appleton Haven*, and wrote a *Life of Lafayette*, pub. 1824 in the *North American Review*. He pub. 1864 a biography of his friend, W. H. Prescott, the historian. The bent of his mind was expository, rather than keenly critical, but in his systematizing and making accessible a vast mass of vague and unexplored material, his *History of Spanish Literature* has a merit and rendered a service of very high order. See *Life, Letters, and Journals of George Ticknor* (Boston 1876).

TICKNOR, *tĭk'nẽr*, William Davis: publisher: 1810, Aug. 6—1864, Apr. 10: b. Lebanon, N. H. He engaged in the publishing business in Boston 1832, for the first year with a partner, then till 1845 in his own sole name; after 1845 he had two partners, John Reed and James T. Fields (Ticknor, Reed, and Fields); after 1854 the style was 'Ticknor and Fields.' The firm took high rank from its start. T. was among the first publishers in America to compensate foreign authors whose works they issued: the beginning was the payment of £100 to Tennyson, 1842.

TICONDEROGA, *tī-kŏn-dĕr-ō'ga:* village in Essex co., N. Y., on the outlet of Lake George, near that lake and Lake Champlain, and on the Central Vermont and Delaware and Hudson railroads; about 95 m. n-by-e. of Albany. It is at the terminius of a mountain ridge between the two lakes, whose highest point, Mt. Defiance, is 750 ft. above the level of Lake Champlain. The outlet of Lake George, 4 m. long, has a fall of 220 ft. in 2 m., which gives the town excellent motive-power for its manufacturing establishments. Since the fire which destroyed nearly the whole business portion 1875, the town has been substantially rebuilt, and has gas and electric lights, several churches and public schools, a national bank and weekly newspaper. The chief manufactures are dairy and lumber products, sashes and blinds, wood pulp and paper. Iron ore and superior graphite are found in the vicinity. T. is the s. terminus of the Lake Champlain steamboat line, and is about 2 m. from old Fort Ticonderoga, whose ruins are visited by many tourists annually. Pop. (1910) 2,475.

Fort Ticonderoga.—The fortification of the promontory was begun by the French after strengthening Crown Point 1755, and was first named Carillon. In 1755 Sir William Johnson (q.v.) undertook the capture of the

works here and at Crown Point, but was deterred by the heavy reinforcing of the French; yet, desiring a strong post on Lake George, he encountered and defeated Baron von Dieskau (q.v.), and fortified Fort William Henry (q.v.), at the s. end of Lake George. In 1757 Gen. Montcalm left Fort Carillon with a strong French force and reduced Fort William Henry.—In 1758 Gen. Abercrombie, with a British army of 15,000 men, was repulsed in an attempt to carry Fort Carillon by storm; 1759 Gen. Amherst, with 12,000 men, invested the fort till the French were compelled to dismantle and abandon both this fort and Crown Point; and subsequently the English enlarged and strengthened the works at Ticonderoga and Crown Point at an expense (reported) of $10,000,000.—At the beginning of the revolutionary war, Fort Ticonderoga was much reduced in strength and was held by a small British force. Ethan Allen (q.v.) surprised and captured the place 1775, May 10.—Gen. Burgoyne, 1777, July, besieged and took the works, having erected a battery on an unprotected height which commanded the place.—Americans under Gen. Lincoln, 1777, Sep., captured the works on Mt. Hope and Mt. Defiance, released prisoners, and seized valuable war material, but were unable to capture the main fortification. After Burgoyne's surrender the works were dismantled and evacuated.—In 1780 the British reoccupied the place for a short time.

TICUNA, *te-kô'nâ*, or TUCUNA, *tô-kô'nâ:* a tribe of aboriginal Indians found in the forests of Brazil and Peru, around the confluence of the Javary and Marañon or Upper Amazon. They are of slender but good physique, have dark skins, and live in a state of nature, their sole adornments being feather armlets and monkey teeth necklets. They live by fishing and hunting.

TID, a. *tĭd* [AS. *tidder*, tender]: tender; soft; nice—now found only in TID-BIT, or TIT-BIT, n. *-bĭt*, a choice or tender piece.

TID, n. *tĭd* [AS. *tid;* Ger. *zeit*, time, season (see TIDE)]: in *Scot.*, proper time; season; proper condition of soil for tillage; humor.

TIDAL. See under TIDE.

TIDBALL, *tĭd'bal*, JOHN CALDWELL: soldier: b. Ohio co., in the old Virginia, 1825, Jan. 25; d. 1906. He graduated at West Point 1848, and was assigned to the 3d artillery. He served in the Army of the Potomac from Bull Run to Gettysburg; was made colonel of the 4th N. Y. artillery 1863, Aug. 28; commanded the artillery of the 2d corps through the Richmond campaign, and was engaged in the operations which resulted in Lee's surrender. He became colonel of the 3d artillery 1885, and was brevetted brigadier-general of volunteers. He was retired in 1889. Tidball was author of a *Manual of Heavy Artillery Service.*

TIDE, n. *tīd* [AS. *tid*, hour, time: Dut. *tijd;* Ger. *zeit;* Dan. and Sw. *tid*, time, season]: time; season—now used only in composition, as Christmas-*tide;* fit time; opportunity; the alternate ebb and flow, or rising and falling, of large bodies of water, specially of the waters of the ocean, and of bays, rivers, etc., connected with it (see TIDES); ebb and flow; stream; current; favorable course; turning-point: V. to drive with the stream; to work in or out of a harbor or stream by favor of the tide. TI'DING, imp. TI'DED, pp. TIDAL, a. *tī'dăl*, of or pertaining to the tides; periodically falling and rising with the tides, as a river. TIDELESS, a. *tīd'lĕs*, having no tides. TIDAL BASIN, a dock that is filled on the rising of the tide. TIDAL RIVER, a river whose waters up to a certain point in its course rise and fall under the influence of the tide-wave. TIDAL WAVE, the wave of the tides; improperly, the wave of translation produced in the ocean by causes other than those producing the tides, e.g., submarine earthquakes; hence such a wave is improperly called tidal, and should be designated 'earthquake wave,' etc. In a figurative sense, a great and rapid diffusion throughout a community of some passionate impulse.—See TIDES: WAVE: EARTHQUAKE. TIDE-CURRENT, a current in a channel caused by the alternation of the level of the water during the passage of the tide-wave. TIDE-DAY, the interval between two successive arrivals at the same place of the vertex of the tide-wave. TIDE-GATE, in a *basin* or *dock*, a gate to prevent the waters flowing back when the tide ebbs. TIDE-GAUGE, an instr. or apparatus for registering the state of the tide at every instant of time. TIDE-MILL, mill in which tide-water is the motive-power (see WATER-POWER). TIDE-TABLES, tables showing the time of high water at any place for any day of the year. TIDE-WAITER, custom-house officer who waits for the arrival of vessels, and remains on board to see that the revenue laws are not violated while the ship is in port. TIDE-WAVE, the accumulation of the waters of the ocean which is caused by the action of the moon, modified by that of the sun, and which changes its position throughout the day. TIDE-WAY, the channel in which the tide sets. EBB-TIDE, the falling back of the water toward the sea. FLOOD-TIDE, the rising and flow of the tide toward the shore. NEAP-TIDES, the tides of least range, caused by the sun and moon when at right angles to each other—that is, during the first and third quarters of the moon. NOONTIDE, the time when the sun is highest in the heavens. SHROVE-TIDE, the time or season for shriving—that is confessing sins—viz., Tuesday before Ash-Wednesday. SPRING-TIDE, the season or time when spring commences. RETARD or AGE OF THE TIDE, the interval between the transit of the moon at which a tide originates, and the appearance of the tide itself. SPRING-TIDES, the highest, and at the same time the lowest, tides, caused by the joint attraction of the sun and moon when acting in the same direction. TWELFTH-TIDE, the time of Epiphany. TO TIDE OVER A DIFFICULTY, to pass over or succeed by patient effort in surmounting some difficulty.

TIDES: alternate ebb and flow of oceanic and connected waters. It was known certainly as early as the time of Cæsar, probably long before, that the time of high-water, also the height of the tide, are in some way connected with the age of the moon. And even in the present state of science, what is called the *establishment* of a port, or the time of high-water at new or full moon (that is, the interval between the moon's crossing the meridian and the full tide), which is practically the most important part of the whole question, cannot be predicted by theory, but must be obtained by observation. The first attempt to explain the phenomena of the tides was by Newton; and, considering the little that has since been effected, his approximate solution must be pronounced highly creditable, though in many respects unsatisfactory. D. Bernouilli and others have slightly improved Newton's method; and a complete solution of the problem has been attempted by Laplace. The principles involved in this solution are undoubtedly correct, and the result, so far as it goes, leaves little to be desired. But it is not extensively applicable, for two reasons: first, the lack of adequate knowledge as to the depth of the sea; and, secondly, even with that knowledge, the excessive difficulties of the mathematical processes required in taking account of it, and of the forms of continents and islands.

Newton's approximate method consists in the study of the problem as a *statical* one, and this we will presently describe. Laplace, on the other hand, treats the problem as one of fluid *motion*. Airy and others have, more recently, attempted, with success, to simplify Laplace's process. Curiously, however, the results of all these theories are very much alike; and, while some of the results agree well with observation, others seem irreconcilable with it. We cannot explain Laplace's method without employing high analysis, quite unsuited to this work; so we must be content to describe the faulty theory. In the Newtonian or *Equilibrium* theory, we consider the earth to be spherical, and covered with a layer of water, which would, of course, if left to itself, be uniformly deep over the whole surface. The attraction of the moon (per unit of mass) on the water immediately below her is greater than her attraction on the solid earth (per unit of mass), and tends, therefore, to raise the water at that part of the surface. At the point of the surface directly opposite to the moon, the water-layer is further from the moon than the bulk of the earth; consequently the moon attracts the water (per unit of mass) *less* than it attracts the earth. The tendency is, as it were, to pull the earth away from the water, so that here also the water is raised, though not *quite* so much as on the other side, as the moon's attraction diminishes with distance. The effect of the moon's action on the previously uniform layer of water is thus to elongate it both ways in the direction of the line joining the centres of the earth and moon. On account of the very small amount of this elongation, it is found by mathematical processes, which we cannot give here, that the form of

the surface will become nearly a prolate spheroid (a solid formed by revolution of an ellipse about its *longer* axis).

Before proceeding with explanation, a mistake is to be noted, sometimes expressed by the assertion that since, if the moon and earth were rigidly fixed to each other, the water would rise only on the side next the moon, this must be the case in nature also. This is the same mistake as those commit (see PERTURBATIONS) who allow that at new moon the sun virtually diminishes the moon's gravitation toward the earth, but refuse to allow that the same is true at full moon.

We have now to consider that the moon revolves about the earth, and that the earth also revolves about its axis. Thus the equilibrium figure has never time to form; but an imperfect form of it travels round the earth in the time of a lunar day (24 hours 54 minutes). If the moon be on the equator, it is obvious that similar portions of the water-spheroid will reach any one spot on the earth at intervals of half a lunar day (12 hours 27 minutes). If the moon's declination be considerable, this will not be the case—a place, e.g., whose latitude is equal to the moon's declination, will be reached by one pole of the wave-spheroid when the moon is on the meridian; but in 12 hours 27 minutes, the other pole of the spheroid will not pass over the place, but at a meridian distance of twice the latitude of the place, or twice the moon's declination. Thus, when the moon's declination is sensible, the two tides of each day are not generally equal in height, except for places on the earth's equator. This gives rise to what is called the *diurnal* tide, which is, as it were, superposed upon the ordinary, or *semidiurnal*, tide, and ought to be more sensible as the latitude is greater. Owing to fluid friction and other causes, we should expect that the axis of the tidal spheroid would lag a little behind the moon, and this is found to be the fact.

So far, we have a general explanation of the occurrence of tides twice a day, and of their dependence on the moon. But we started with two assumptions not consistent with fact—viz., that the earth is spherical and uniformly covered with water, and that the moon is the only tide-producing body. The corrections to be made in consequence of the inaccuracy of these assumptions must now be explained. We begin with those due to the latter assumption. The sun, though at an immense distance compared with that of the moon, has such an enormous mass that his tide-producing influence is comparable with that of the moon. In fact, it is easy to see that, as Newton showed, the tide-producing power of an attracting mass is directly as the mass, and inversely as the *cube* of its distance. That it is directly as the mass, is obvious. To prove the other assertion, let R be the earth's radius, D the distance of the attracting body from the earth's centre; then the attraction per unit of mass on the earth is to that per unit of mass on the water nearest the attracting body as

$$\frac{1}{D^2} \text{ to } \frac{4}{(D-R)^2}$$

according to the law of gravitation. The difference between these quantities is proportional to the tide-producing force. But

$$\frac{1}{(D-R)^2} = \frac{1}{D^2\left(1-\frac{R}{D}\right)^2} = \frac{1}{D^2}\left(1+\frac{2R}{D}+\text{etc.}\right)$$

$$= \frac{1}{D^2}+\frac{2R}{D^3}+, \text{ etc., the remaining terms being omitted,}$$

since D is always much greater than R. The difference is therefore approximately

$$\frac{2R}{D^3},$$

as stated above.

Now the mass of the sun is to that of the moon as 355,000 to 0·0125, and the sun's distance is about 400 times that of the moon. Hence, the tide-producing power of the sun is to that of the moon as

$$355{,}000 \text{ to } \cdot 0125 \times 400^3$$
$$\text{or } 355 \text{ to } 800.$$

By calculations, which we cannot give here, it has been shown that the difference of length of the axes of the wave-spheroid produced by the moon alone is about 58 inches; so that in that due to the sun it will be about 25·7 inches.

In consequence of the extremely small amount of these effects on the sea-level, we are entitled to simply add or superpose the separate effects of the sun and moon, in order to obtain their joint effect. And now we have at once the explanation of what are called *spring* and *neap* tides. At new and at full moon, the wave-spheroids due to the sun and moon have their axes almost coincident, so that we have a tide which is to the lunar alone as 800 + 355 to 800, or as 13 to 9 nearly; while, when the moon is in her first or last quarter, the axes are nearly at right angles, and the compound tide is to the lunar tide as 800 — 355 to 800, or as 5 to 9 nearly. Thus, the height of the spring-tide is to that of the neap-tide in the ratio of about 13 : 5.

Another curious phenomenon, which we can now easily account for, is the 'priming' and 'lagging' of the tides, or the *acceleration* and *retardation* of the time of high-water. If the tides were due to the sun or moon alone, they would recur at equal intervals of time; and this is the fact with the lunar and solar tides separately. But what we observe is the compound tide, and this will obviously have its maximum *between* two consecutive maxima of the lunar and solar tides; but nearer to the lunar tide, as it is the greater. Thus, if about new moon the sun passes the meridian *before* the moon, the tide is accelerated; if *after*, it is retarded. And the same is true about full moon, only that in this case our statement refers to passages of the sun and moon on opposite sides of the meridian. This retardation or acceleration has for its greatest value a period of rather less than an hour; and the respec-

tive maxima occur about 4½ days before and after the spring-tides.

But we meet with far more serious difficulties when we come to consider the actual distribution of water over the earth's surface; and it is here that future improvements in method must be looked for.

But even so inadequate an attempt at a solution as is the equilibrium theory gives us the means of explaining many curious phenomena. It shows, e.g., how exceedingly small we should expect to find the tides in an inland sea, such as the Mediterranean; for there, even when the moon is most favorably situated, the utmost difference of level would be (by calculations which we cannot give here) only about an inch or two; and of this, part would be the rise in one portion of the sea, the rest the fall in others. The popular explanation of this phenomenon is very simple. We have but to notice that, according to the equilibrium theory, the form of the water is a spheroid of definite dimensions, its axes differing from each other by 58 inches. But a small portion of such a spheroid (of the dimensions of the Mediterranean, for instance) can hardly be distinguished from a sphere; so that the form of the surface of a limited mass of water will be but slightly altered by the attractions of the sun and moon.

It is obvious from what has now been said, that the rise of the waters in tidal rivers, estuaries, and deep bays, where it sometimes amounts (even in calm weather) to more than 100 ft., cannot possibly be due to the moon's action on the water of the mere river or bay, but must be almost entirely produced by the tidal wave in the ocean; and, in fact, this part of the problem presents comparatively little difficulty. Once grant the fact of the tidal disturbance of sea-level at the mouth of a river, and the calculation of the motion of the consequent wave in the river-channel is within the power of mathematics. It is by means of investigations made from this point of view, and by others concerning the effect of the moon on long canals, that Laplace's method has been improved. For the details of the process, see Airy on 'Tides and Waves,' in *Encyc. Metrop.* We can here only point out a few of the immediate consequences of the periodic rise and fall of the sea-level as regards the motion of the water of a tidal river. Here the tide always runs *up* the river, even when this is the opposite direction to that in which the moon appears to move. In the open sea at the mouth of the river the interval from high to low water is almost exactly equal to that from low to high water each being about 6½ hours nearly. But the further we go up the river, the greater becomes the disparity between these periods, high-water following low-water at shorter and shorter intervals, while the intervals during which the tide falls are correspondingly increased. In some cases, the interval from low to high water is so short that the tide-wave rushes suddenly up, and, spreading over the flat sands at the side of the channel, forms a dangerous surf called a *Bore* (q.v.).

Connected with these peculiarities, there is also a singu-

lar effect produced on the direction of the current in a tidal river. In the open ocean, the water merely rises and falls, there being no perceptible tidal current. Sailors are in the habit of associating the cessation of currents, or 'slack' water, with the occurrence of high and low water. This is the case in bays, but not in rivers, and it gives rise to some curious errors regarding the time of high-water in rivers. Thus it is sometimes said that it is high-water in the centre of a river-channel long after it is high-water at the shore—an obvious absurdity. The truth is, the current does not cease simultaneously at the shore and in mid-channel. At the mouth of a tidal river, the water runs upward for hours after high-water, and downward after low; and the same is true, in less degree, at places higher up the stream.

When considerable alterations of breadth or depth occur in the channel of a river, we find corresponding alterations in the amount of rise of the tide. Thus, according to Airy, at the entrance of the Bristol Channel the whole rise at spring-tides is about 18 ft.; at Swansea, 30 ft.; and at Chepstow, 50 ft. At Annapolis, in the Bay of Fundy, the tide is said to rise 120 ft. Again, the same port may be reached by two tide-waves coming from the ocean by different channels; and here we have to compound the two disturbances just as we did with the separate lunar and solar tides. In the German Ocean, we have a very good example; but the most remarkable is the tide at Batsham, in Tonquin. At this port, two tide-waves meet, coming respectively from the Indian and China seas; these bring, simultaneously, opposite but nearly equal changes in the water-level, so that there is almost no perceptible tide.

Whewell, Lubbock, and others have added much to our knowledge of the *facts* of the tides; and have constructed what are believed to be approximately accurate charts of *Cotidal Lines*—that is, lines representing the positions of the crest of the tide-wave at hourly intervals as it sweeps round the earth. Much, however, remains to be done in this direction, before we can elicit from observation such hints as may enable us to improve the mathematical theory of the subject.

The frictional resistance to the motion of the tide-wave of course produces heat. This heat is a transformation of part of the earth's energy (see FORCE) of rotation; thus it appears that the tides are gradually lengthening the day. We may see easily that this would go on, were the moon the only tide-producing body, so long as the earth rotates about her axis in less time than a lunar month. For, if the length of the (sidereal) day were that of a lunar month, the earth would always turn the same face to the moon; and the tide-spheroid would have a *fixed* position on the earth, and there would be no loss of energy by friction. Simple as this deduction is, though it seems to have been roughly guessed at by Kant, it was not formally enunciated till after his time. Mayer was the first to publish anything on the subject, though it seems to have been previously noticed by others. One of the most curious deductions

from it is the recent speculation which assigns, as the cause of the moon's turning always the same face to the earth, the friction of the enormous tides which must have been produced by the earth in her mass when it was in a molten state, on the surface at least, if not throughout.

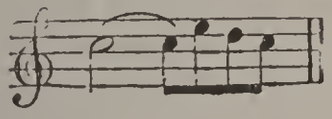
For tidal evolution and the theory, based on Dr. G. H Darwin's calculations, that in early geologic times the size of the tides was vastly greater than at present (owing to the greater nearness of the moon), see *Nature*, XXV., XXVI.

TIDINGS, n. plu. *tī′dĭngz* [AS. *tidan*, to happen: Dut., *tijding;* Dan. *tidende;* Ger. *zeitung*, events, news (see TIDE)]: news; intelligence; information—formerly sometimes used in the singular. TĪ′DINGLESS, a. without news or tidings.

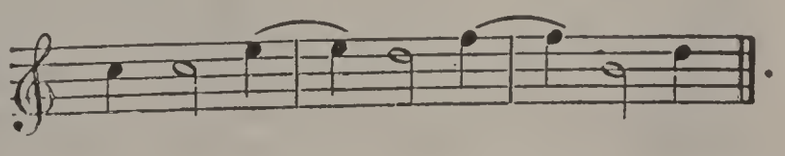
TIDOLOGY, n. *tī-dŏl′ŏ-jĭ* [Eng. *tide*, and Gr. *logos*, discourse]: the theory or doctrine of the tides; that department of science which treats of the general laws that govern tides, and the circumstances, of a local or casual nature, which may influence their height and time.

TIDY, a. *tī-dĭ* [Dan. and Sw. *tidig*, timely: Ger. *zeitig*, seasonable: Dut. *tijdig*, timely, in season (see TIDE)]: seasonable; opportune; suitable; arranged in good order; neat; orderly; respectable; good; satisfactory: V. to make neat and clean; to put in good order: N. a piece of fancy work to throw over the back of an arm-chair, a sofa, or the like; a child's light outer covering; a pinafore. TĪ′DYING, imp. TĪ′DIED, pp. *-dĭd*, arranged in neat order. TĪ′DILY, ad. *-dĭ-lĭ*. TĪ′DINESS, n. *-nĕs*, the quality or state of being arranged with neatness and simplicity. *Note.*—The entries *tide*, *tidings*, and *tidy*, are etymologically connected, though conveying widely different ideas.

TIE, v. *tī* [AS. *tige*, a drawing, a tie; *teón*, to pull: Icel. *taug*, a tie: Low Ger. *teen;* Ger. *ziehen*, to draw]: to fasten or bind, as with a cord; to make fast; to unite so as not to be easily parted; to constrain; to confine; to unite; N. a fastening; a knot; obligation arising from relationship or friendship; a piece of timber or metal used to bind together two bodies having a tendency to diverge: in *music*, a curved line written over two notes on the same degree, uniting them so that they are played or sung as a single note of the same value. Thus, for the two C's written in the example



, one is played of the value of a minim and quaver combined. The tie is often used in syncopated passages to connect the last note of one measure with the first of the succeeding one, when the former note, which would otherwise be unaccented, acquires the emphasis of the latter :



(See SYNCOPATION.) *Tie* is also an equality in numbers

as in votes, so hindering either party from being victorious; a knot of hair; a sort of neckcloth. TY'ING, imp. TIED, pp. *tīd.* TI'ER, n. *-ĕr*, one who or that which ties. TIE-BEAM, the horizontal beam which connects the bottom of a pair of principal rafters (see ROOF). TO TIE DOWN, to fasten in order to hinder from rising; to impose a legal or moral obligation upon; to restrain. TO TIE UP, to confine; to restrain, especially used of money.—SYN. of 'tie, v.': to bind; fasten; knit; hold; hinder; obstruct; oblige; constrain; restrain; confine; knot.

TIECK, *tēk*, LUDWIG: brilliant and prolific German novelist and poet of the romantic school: 1773, May 31—1853, Apr. 28; b. Berlin. He studied at the universities of Halle, Göttingen, and Erlangen. He made his first appearance as an author in the *Straussfeder* (Ostrich-feather) magazine, conducted by Musäus (q.v.) and J. G. Müller, for which he wrote a series of little tales, of which the best was *Die beiden merkwürdigsten Tage aus Siegmann's Leben* (The Two Most Remarkable Days in Siegmann's Life). But the originality of his genius displayed itself first in his romances of *Abdallah* (Berl. 1795) and *William Lovell* (3 vols. Berl. 1795). These were followed by his *Peter Lebrecht, eine Geschichte ohne Abenteuerlichkeiten* (Peter Lebrecht: a History without Adventures, 2 vols. Berl. 1795–6), and *Peter Lebrecht's Volksmärchen* (3 vols. Berl. 1797), remarkable equally for richness of fancy, artless simplicity, and overflowing humor. In some of these *Märchen*, e.g., his 'Bluebeard,' 'Puss-in-Boots' (*Der gestiefelte Kater*), and 'The Life and Death of Little Red Riding-hood' (*Leben und Tod des kleinen Rothkäppchen*), he combated with satiric humor, perhaps, too, with some youthful arrogance, the 'enlightened' notions on which the literature of the 18th c. prided itself—showing distinctly his strong tendencies toward the deeper poetic spirit of the middle ages. The same polemic was maintained in his comedy *Die verkehrte Welt* (The Topsy-turvy World, 1799). To this period belong also his *Herzensergiessungen eines kunstliebendenn Klosterbruders* (Heart-effusions of an Art-loving Monk, Berl. 1799), *Franz Sternbald's Wanderungen*, art-novel (2 vols. Berl. 1798), and *Phantasien über die Kunst* (Fancies on Art, Hamb. 1799); full of noble enthusiasm for art, but pervaded by a dreamy mystical religiosity, which is no longer admirable. These works brought T. into close relationship with A. W. von Schlegel and others, and led to the establishment of the literary sect or coterie known as the 'Romantic School' (q.v.), whose influence on the later literature of Germany and France has been very great, and not always very good. T. now married the daughter of a Hamburg clergyman who had been a friend of Lessing; and 1799 went to Jena, where he added Steffens to the list of his friends. Here he published his famous *Romantische Dichtungen* (2 vols. 1799–1800). His transl. of *Don Quixote* (4 vols. Berl. 1799–1801, 3d ed. 1831) far surpassed all previous attempts. In 1802 he joined A. W. von Schlegel in the *Musen-Almanach;* and 1804 published his longest romance, *Kaiser Octavianus.* T.'s health now began to fail, and 1805 he

visited Italy. On his return to Germany, he settled, after some changes, at Ziebingen 1811, where he formed a friendship with the philosopher Solger, who exercised a great influence over his mind. Thenceforth he showed less of the dreamy and formless mysticism of his earlier years, and more of the artistic element. The change—amounting to a break with the romantic school—becomes visible in *Phantasus* (3 vols. Berl. 1812-15) and in *Ulrich's von Lichtenstein Frauendienst* (Tüb. 1815). In 1817, with a friend, Burgsdorf, he visited England, where he collected fresh materials for his Shakespeare. 1819-40 he resided at Dresden; but on the accession to the throne of Friedrich Wilhelm IV. of Prussia, he was invited to Berlin; and there resided for the rest of his life.—Important works of Tieck's, besides those above mentioned, are: *Novellenkranz* (Berl. 1831-35, complete in 12 vols. Berl. 1853), in which there is hardly a trace of the credulous romanticism of his earlier years, but abundance of lively and subtle talk on the literature and life of the Present; *Dramaturgische Blätter* (2 vols. Bresl. 1826), repub. in his *Kritische Schriften* (4 vols. Leip. 1848-52); *Shakespeare's Vorschule* (2 vols. Leip. 1823-29); and his splendid continuation of Schlegel's translation of Shakespeare. Tieck revised a collected but incomplete edition of his works, 20 vols. (Berl. 1828-42). In Eng. transl., see tales from *Phantasus* in Carlyle's *Specimens of German Romance;* Bp. Thirlwall's rendering of *The Pictures* and of *The Betrothal.*—See Köpek's admirable *Life of Tieck* (2 vols.), which gives a complete chronological list of Tieck's works.

TIELE, *tē'lĕ,* Cornelius Petrus: Dutch writer on comparative religion: b. Leyden 1830, Dec. 16; d. there 1902, Jan. 14. He was educated at Leyden and Amsterdam, in 1853 became pastor of the Remonstrant congregation at Moordrecht, and in 1856 removed to Rotterdam, where he became closely associated with Albert Réville, whose liberalism in theological matters he fully shared. He was director of the Remonstrant theological seminary at Leyden from 1873 till his death, and during 1877-1901 held the professorship of the science of religion in the University of Leyden, a chair specially created for him. In 1896-8 he delivered the Gifford lectures in the University of Edinburgh. He was one of the pioneers in the study of comparative and historical religion, and among his chief works are: *The Religion of Zoroaster* (1864); *Comparative History of the Egyptian and Mesopotamian Religions* (1869-72); *History of Religion in Antiquity* (1892-6; second ed., 1901); *Western Asia in the Light of the Most Recent Discovery* (1893); *Elements of the Science of Religion* (1899).

TIEN-TEH, *tē-ĕn'tĕh'* (Celestial Virtue): name given to *Tae-ping-wang* (king of universal peace), pretender to imperial authority in China, and head of the mighty in-

surrection which for 16 years convulsed that country. See CHINESE EMPIRE: TAE-PINGS.

TIEN-TSIN, *tē-ĕn'tsēn'* (Heaven's Ford): large and important city and river-port of China, province of Chihle, on the right bank of the Pei-ho, near the junction with the Grand canal, 34 miles from the mouth of the Pei-ho by land, and 68 miles by the windings of the stream; lat. 39° 10′ n., long. 117° 3′ 55″ e. It is the port of the city of Peking, from which it is 80 miles s.e. The streets are unpaved, and the houses, principally of mud or dried bricks, have a mean appearance, though the central parts of the town are filled with well-built houses. The maximum of heat in summer is 106°, the maximum of cold is 6° below zero. The river is generally frozen over from about the beginning of Dec. to the middle of March, and the business, at other times carried on by means of boats and junks, is taken up by sledges, which swarm on the river. By the treaty of Tien-Tsin, signed here 1858, Nov., and by the subsequent convention of Peking, 1860, Oct., the port was declared open; and the first consulate was established 1861, Jan. In 1881 Tien-Tsin was connected by telegraph with Shainghai (the line extending to Peking). There is large and increasing transit-trade with Russia *viâ* Siberia, tea to the value of about $4,500,000 having been forwarded 1875 from Tien-Tsin overland to Russia. The principal imports are opium; shirtings, chintzes, and other cotton goods; needles, window-glass, sugar (brown and white), and paper; chief exports are peas and dates. A large arsenal and extensive powder-mills are maintained by the government. Tien-Tsin is the name also of the *department* of which Tien-Tsin is the chief city.—Pop. of city (which is walled and of about 3 m. in circuit) and of the suburbs reckoned at 1,000,000. During the Boxer uprising of 1900, Tien-Tsin was the center of military operations. On July 13-14 the native city and the forts were captured by the allies.

TIER, n. *tēr* [OF. *tiere,* a row: Dut. *tuyer;* Low Ger. *tier,* a row of connected things]: a row, especially where two or more are placed one above another, as seats in a theatre or other public building.

TIERCE, n. *tērs* [F. *tierce,* a third—from L. *tertĭus,* third—from *tres,* three]: a third; a cask where contents are one-third of a pipe—viz., 42 gallons; a cask intermediate in size between a barrel and a hogshead: in *gaming,* a squence of three cards of the same color: a particular thrust in Fencing (q.v.): in *music,* a major or minor third: in *her.,* a term indicating that the field is divided by lines into three equal parts (*tiercé*). A shield may be tiercé in pale, in fess, in bend, in bend sinister, or in pall.

TIERCEL, n. *tēr'sĕl,* or TIER'CELET, n. *-slĕt* [F. *tiercelet,* a male hawk—from mid. L. *tertĭolus,* a goshawk—from L. *tertĭus,* the third]: a small goshawk—so called from being the male, and a third smaller than the female,

or from its being, according to an old fancy, the product of a third egg.

TIERRA DEL FUEGO, *tē-ĕr'râ dĕl fwā'gō* (Land of Fire): large archipelago at the extreme s. of S. America, from whose mainland it is separated by Magellan's Strait (see MAGELLAN, STRAIT OF). It comprises 11 large islands, of which the chief is King Charles's South Land, and about 20 islets; lat. 52° 40′—55° 59′ s., long. 63° 30′—74° 35′ w. The group extends more than 400 m. n.w. and s.e., nearly in line with the Patagonian Andes; and about 270 m. e. and w., diminishing southward. King Charles's South Land, which forms more than three-fourths of the entire area, is more than 200 m. long from n. to s.; about 21,260 sq.m. This island, like the other islands of the archipelago and the coast of the mainland, is much broken on the w. side by gulfs and inlets. The e. coasts are mostly level and wooded; the w. coasts rocky and mountainous. The general aspect of the group is wild and desolate in the extreme. Some localities, however, present a milder scene: the coast-scenery of Picton Island resembles that of the s.w. coast of England. The s. part of the island is chiefly in moor and down; the n. is covered with forests. The scenery is fine, and there are fresh-water lakes, frequented by abundance of water-fowl. Many of the mountains are volcanic—whence the name of the region; and lava and volcanic productions abound. The highest mountains rise 6,000 to 7,000 ft., and are covered with snow. The climate is raw and cold, violent rains and snow-storms occurring in every season of the year. In this region, the waters of the Atlantic and Pacific meet and struggle together, and terrific tempests are frequent. Wild celery and spoonwort are the only edible plants; but by far the most important articles of food are shell-fish, which abound on the coasts, and a globular fungus, which grows in clusters round the trunk of the antarctic beech—an elegant evergreen, and the prevailing tree in the archipelago. Three different tribes of people inhabit the archipelago, which (since 1881) is divided between Chili (the w. portion) and the Argentine Republic (the e. portion). The Onas, who are tall and resemble the Patagonians, occupy the n. and e.; the Yahgans are found on the Beagle Channel and the s. islands; the Alaculoofs are on the w. islands. The last two tribes are stunted and degraded, the men being about 5 ft. 3 in. in height, the women 5 ft. The only quadruped among them is the dog. When driven to extremities, they first eat their dogs, and then kill and eat the old women of their tribe. Abortive attempts have been made to convert these savages to Christianity. In 1850 a mission-party of seven men, under Capt. Allen Gardiner, projector of the expedition, arrived at Tierra del Fuego. The missionaries were not well received by the natives, and the narrative of their residence on these coasts is a record of miserable disasters. By gross mismanagement on the part of the

home authorities, the wants of the mission-party were neglected, and they were soon destitute of provisions. The promised relief never came; and, in the autumn of 1851, the whole party, after great sufferings, died of starvation. In the autumn of 1854, another missionary expedition set sail from Bristol, England, for Tierra del Fuego, under command of Capt. W. Parker Snow; but, after many endeavors, the attempt to form a mission-station was abandoned.

TIERS ÉTAT, n. *tērz' ā-tâ* [F. third estate]: in *F. hist.*, the third branch of the legislative assembly, consisting of representatives of the trading inhabitants of the towns, and of the peasantry in the country. The tiers état had an important part in the opening scene of the Revolution. On the two other estates of nobles and clergy refusing to join them and deliberate in a common chamber, they, 1789, June 17, assumed the title *Assemblée Nationale*, with the sole right to legislate for France. The French tiers état differed completely in its origin from the third estate or commons of England. The latter originated in the permission granted to the minor barons, instead of personally attending the national council, to appear by representatives; and with the representatives of the minor barons were joined in one house the representatives of the municipalities, which, as corporations, came to be considered in the light of tenants *in capite* of the crown. The designation 'commons,' and the absence of title, have often misled foreigners to suppose that the men who gained their liberties and constitution for the English people were the *roturiers* or *bourgeois;* whereas they mostly belonged to the class which would, in continental phraseology, be called the nobility of the country.

TIETJENS (or TITIENS), *tēt'yĕnss*, TERESA: one of the greatest of recent operatic singers: 1834—1877, Oct.; b. Hamburg; of Hungarian parents. She made her *début* in that city in the character of Lucrezia Borgia, 1849, taking at once a very high position on the lyric stage; at Frankfurt and Vienna she was even more warmly received; and her first appearance in London, 1858, was quite a triumph. The great volume and purity of her voice, and her energetic but dignified acting, combined to make her an unrivalled representative of strong dramatic parts. She acquired great fluency and flexibility of voice by diligent practice. She was probably the hardest-worked singer that has appeared; and though this did not seem to injure her voice, it doubtless wore out her constitution.

TIFF, n. *tĭf* [prov. Eng. *tiff*, a sup or draught of drink; *tiffing*, eating or drinking out of season: Norw. *tev* or *tæft*, drawing the breath]: a small sup or draught of liquor; a slight quarrel or altercation. TIFFIN, n. *tĭf'-fĭn*, a slight repast between breakfast and dinner; luncheon—a term generally used among Anglo-Indians. TIFT,

n. *tĭft*, a fit of ill-humor or peevishness; altercation. TIFTY, a. *tĭf'tĭ*, ill-natured; petulant; also TIF'FISH, a. *-fĭsh*.

TIFFANY, n. *tĭf'fă-nĭ* [perhaps the same as TAFFETA, which see]: a kind of gauze or very thin silk.

TIFFANY, *tĭf'a-nĭ*, CHARLES COMFORT, D.D.: Prot. Episc. minister: b. Baltimore, 1829, Oct.; d. 1907, Aug. 20: brother of Otis H. Tiffany. He pursued his academic and theological studies in Dickinson Coll., Andover Theol. Seminary, and in Halle and Heidelberg universities. He entered the Congregational ministry; but afterward (1866) was ordained priest in the Protestant Episcopal Church. He was rector of churches in Boston and in the suburbs of New York, and for 18 years in Zion Church in New York. He was a discriminating thinker and a lucid writer; and published essays on Rationalism, Agnosticism, and other topics; and a book of travel, *Norway and the Midnight Sun*. His History of the Protestant Episcopal Church in the United States shows thorough research, prosecuted in that spirit of candor which is one of the fruits of Christian charity, and set forth in admirable literary form.

TIF'FANY, LOUIS COMFORT: artist painter: b. New York, 1848, Feb. 18. He studied painting under George Innes in New York and in Paris under Léon Bailly. He then travelled extensively in Europe and in Africa. Returning to America 1870, he was elected member of the Water-color Soc., and member of the National Acad. 1880. Many of his oil-paintings and works in water-colors are esteemed highly. He is founder of the Tiffany Glass Co. of New York, and he applies himself exclusively to making designs for colored glass windows and other decorative work. His achievements in this branch of design have won him wide fame.

TIF'FANY, OTIS HENRY, D.D.: Methodist Episc. clergyman: 1825-1891, Oct. 24; b. Baltimore, Md. He was educated at Dickinson Coll.; became minister in the Meth. Episc. Chh. 1845; was prof. of mathematics in Dickinson Coll. 1850-57; and then had important pastoral charges in Baltimore, Chicago, Washington, Philadelphia, New York, and Minneapolis, successively. He had wide repute as a preacher and pastor.

TIFFIN, *tĭf'ĭn:* city, cap. of Seneca co., O.; on the Sandusky river, and on the Baltimore and Ohio, the Cleveland, Cincinnati, Chicago and St. Louis, and the Northwestern Ohio railroads; 34 m. s.w. of Sandusky, 42 m. s.s.e. of Toledo. It is the centre of a large wheat region, was located 1821, and made co. seat 1822. It has 16 churches; 39 teachers and 1,550 pupils in its public schools: Ursuline convent, orphan asylum, banks, and daily, semi-weekly, weekly and monthly periodicals. The industries comprise manufacture of iron-foundry products, glass, pottery, stoneware, tiles, carriages, stoves, agricultural implements, sashes and blinds, and woolen

goods. Tiffin is the seat of Heidelberg Coll. (Ref.), opened 1850. Pop. (1900) 10,989; (1910) 11,894.

TIF'FIN, EDWARD: statesman: b. Carlisle, Eng., 1766, June 19—1829, Aug. 9. He came to this country; was educated in the Univ. of Penn. 1789; was a Meth. preacher 1792-99, at the same time practicing medicine in Chillicothe, O.; member of the legislature of the N.W. Terr. 1799, and pres. of the convention that framed the constitution of Ohio, 1802; was the first governor of Ohio, elected 1803, re-elected 1805; was chosen U. S. senator 1807, but resigned 1809, and resumed the practice of medicine; was the first commissioner of the U. S. land office 1812; later for many years surveyor of public lands n.w. of the Ohio river.

TIFLIS, *tĭf'lĭs* or *tĭf-lēs':* government of the Russian lieutenancy of Caucasia, immediately s. of the Caucasus; 15,613 sq.m. It is traversed by several chains of mountains, which belong either to the Caucasian Mts. (the peak of Kazbeck, 17,500 ft. high), and extend over the n. and e. parts of the govt., or to the Ararat, Achaltzick, and Alagiz mountains, spreading from the sources of the Kur and Arax over the southern districts. The principal lake, Goktcha, is about 50 miles long, and nearly 20 miles in extreme breadth. The rivers, the chief of which are the Kur and Arax, rise amid mountains, are very rapid, are confined between high banks, and are not navigable. The climate varies with the elevation of the surface; the soil, very fertile in some tracts, is not in general cultivated. Grain, tobacco, indigo, vegetables, and grapes are produced abundantly. Tiflis is rich in mineral springs and in timber, the principal trees being the oak, elm, chestnut, and maple. The Christian and Mohammedan are the predominant creeds. Pop. about 1,000,000; chiefly Georgians, Armenians, and Tartars.

TIFLIS: important Russian city, capital of the government of Tiflis and of Russian Caucasia (south of the mountain range of that name); on both banks of the Kur, 165 m.—direct line—e.s.e. of the Black Sea. There are several manufactories, of woolen and linen cloths, carpets, arms, leather, and tobacco. There are also several breweries and distilleries. Tiflis was formerly a fortress, and capital of the dist. of Georgia. It has active trade with Persia, and is the great emporium of the Russian territory south of the Caucasus; indeed, its trade, domestic and foreign, is of great importance. In the vicinity are naphtha springs as well as thermal springs, which are much visited. Tiflis was founded in the 4th c., and annexed to Russia 1802. Pop. about 165,000.

TIG, n. *tĭg* [Low Ger. *tikk*, a light touch (see TICK 2)]: in *Scot.* and *prov. Eng.*, the game known in the United States as *tag*, in which one person runs after others till he can *tig* or touch one and cry *tig*, the person so touched becoming, in his turn, a pursuer; the touch or

stroke so given: V. to touch another in the game of *tig*. TIG'GING, imp. TIGGED, pp. *tĭgd*.

TIGE, n. *tēj* [F. *tige*, a stalk or stem—from L. *tibĭa*, a pipe or flute]: in *arch.*, the shaft of a column from the astragal to the capital; in *ord.*, a pin at the base of the breech in the Thouvenin system of firearms, for expanding the base of the ball; an anvil or support for the cap or primer in a central-fire cartridge.

TIGELLUS, n. *tĭ-jĕl'lŭs*, or TIGEL'LA, n. *-lă* [a Latinized word from F. *tigelle*—from *tige*, a stem (see TIGE)]: in *bot.*, the portion of the embryo between the radicle and cotyledons; the young embryonic axis.

TIGER, n. *tī'gẽr* [F. *tigre*, a tiger; *tigré*, spotted—from L. and Gr. *tigris*, a tiger—said to be from O. Per. *tighri*, an arrow, so named from its swiftness]: a fierce rapacious animal of Asia of the feline family (see below): a servant in livery who rides with his master. TI'GERISH, a *-ĭsh*, or TI'GRISH, a. *-grĭsh*, like a tiger; fierce. TIGER-CAT, carnivorous animal resembling the tiger, but of smaller size (see below). TIGER-FOOTED, a. hastening to devour. TI'GRESS, n. *-grĕs*, a female tiger. TI'GRINE, a. *-grĭn*, resembling a tiger; feline. TIGER-SHELL, one of the cowrie-shells—so called from its spots.

TIGER (*Felis tigris*): one of the largest of the *Felidæ*, equal perhaps to the lion in size and strength, and superior in activity. It has no mane. It is more slender than the lion, its whole form more cat-like, its head smaller and rounder. All its motions are performed with utmost grace and apparent ease. It does not climb trees, but winds its way through brush-wood or jungle with great dexterity, runs very swiftly, and can leap an immense distance. It takes its prey either by running or, more frequently, by lying in ambush and leaping upon it. Its strength is such that it is capable of carrying off an ox or buffalo. It is sometimes 15 ft. in entire length to the tip of the tail; an instance is on record of 18 ft.; the height is 3 to 4 ft. The tigers of some regions differ considerably in size from those of others: thus the tiger of Bengal is much larger than that of Bokhara. The hair is thick, fine, and shining; in the colder countries which the tiger inhabits, it is thicker and longer than in tropical regions. The color is a bright tawny yellow, beautifully marked with dark transverse bands, passing into pure white on the under parts; the dark bands are continued as rings on the tail. The tail is long, slightly tapering, clothed with hair similar to that of the body. Individuals sometimes occur of pale whitish color, obscurely striped, the stripes visible only in particular lights. The tiger is found only in Asia. It abounds in Hindustan, in the E. Peninsula, in Java, Sumatra, and other tropical islands. It is found also in China and Japan, and in Persia. Its range, however, does not extend much w. of a line drawn from the mouth of the Indus to the Caspian Sea. It is found as far n. as s.

Siberia, and even on the banks of the Obi. It inhabits woods, and cannot exist without free access to water. The islands of the delta of the Ganges have long been noted as a haunt of tigers. The tiger generally lies concealed in a thicket during the day, and seeks its prey by night. The prey is very often obtained by watching near the places to which animals resort for drinking. Tigers prowl about villages, and enter cattle-folds; they also follow travelling parties, and seize the yoke-oxen and buffaloes, particularly those which straggle away from the encampment at night. The ravages of tigers in some parts of the E. Indies are very great; and a great number of human being are destroyed by them. A notion prevails that a tiger which has once tasted human flesh becomes eager for it, and prefers it to all other food; and a single tiger has been known to kill and devour many people, watching near some frequented path, or prowling around a village. The truth appears to be that this is the mode of obtaining prey to which a tiger sometimes resorts when incapable, through old age, of the active exertion necessary for capturing buffaloes or deer. The tiger brings forth three, four, or five young ones at a birth. When taken young, it is easily tamed, and often shows much affection for those who treat it kindly. Tame tigers are frequently seen in India.

The tiger was less familiarly known to the ancients than the large African *Felidæ*. It is, however, mentioned by Aristotle, and it is frequently mentioned by the Latin poets. Pliny tells us that the first tiger seen at Rome was a tame one belonging to Augustus. The tiger frequently breeds in captivity, but not so frequently as the lion.

Tiger-hunting is a favorite Indian sport, exciting because somewhat dangerous. Europeans generally ride on elephants when engaged in it, and the tiger is shot from the back of the elephant. Natives, however, are employed to beat the wood or jungle for the tiger, and lives are often lost in this way. Tigers are now less numerous than formerly. Many expedients are adopted for their destruction in the countries infested by them. Bows with poisoned arrows are fixed in their paths, so as to be discharged on being touched. Heavy beams are so placed as to fall upon the tiger pressing against a rope, and to crush the animal by their weight. Traps of various kinds are set, sometimes baited with a live goat or other small animal. A very curious mode, practiced in Oude, consists in scattering numbers of broad leaves smeared with a substance like bird-lime in the tiger's path, and if he sets foot on a smeared leaf his fate may be regarded as sealed. He rubs his paw on his face, to get quit of the leaf, and the case becomes worse—the leaves are transferred to his face; fresh attempts to remove the nuisance only add more leaves, till he becomes blinded, and rolls on the ground in rage; while the hunters, ambushed close by, apprised by his howlings, hasten to dispatch him.

TIGER-FLOWER (*Tigridia pavonia*): plant of nat. order *Iridaceæ*, the only known species of its genus, distinguished by the three outer segments of the perianth being larger, and by the filaments being united into a long cylinder. It is a native of Mexico. but hardy enough to endure the climate of more northern countries, and much cultivated in flower-gardens for the singularity and beauty of its flowers, which are, however, very evanescent. The root is a scaly bulb.

TIGHT, a. *tīt* [Icel. *thettr;* Dan. *tæt;* Sw. *tät*, stanch, tight: Ger. *dicht*, solid, thick]: not loose or slack; taut; compact; close in texture or structure; especially, so close as to be impervious to air, gas, rain, water, etc.; not leaky; sitting very close to the body, as clothes; ill supplied or stringent, as the money-market; in *slang*, drunk; tipsy; in *OE.*, handy; adroit. TIGHT'LY, ad. *-lĭ*, not loosely; closely; in *OE.*, not idly; briskly; cleverly. TIGHT'NESS, n. *-nĕs*, the quality or condition of being tight; closeness; compactness; stringency; in *slang*, tipsiness; in *OE.*, cleverness; neatness; adroitness. TIGHTEN, v. *tīt'n*, to draw or make tight or tighter; to straiten; to make close or closer. TIGHTENING, imp. *tīt'nĭng*. TIGHTENED, pp. *tīt'nd*. TIGHTENER, n. *tīt'nėr*, that which tightens. TIGHTS, n. plu. *tīts*, tight-fitting trousers or leggings; part of the stage-dress of a dancer or performer. TIGHT-ROPE, a rope suspended above the earth and tightened, on which acrobats dance and perform other feats.

TIGRANES, *tī-grā'nēz*, THE GREAT, King of Armenia: B.C. 96–55: conqueror of Mesopotamia and parts of Assyria and Media, also of parts of Asia Minor and Syria. Having been involved in a war with the Romans, he was defeated first by the consul Lucullus—who sacked the capital of the Armenian kingdom, Tigranocerta—and then by Pompey the Great, who exacted of T. an enormous sum of money as the price of being permitted to reign in Armenia proper.

TIGRIS, *tī'grĭs* (Heb. *Hiddekel;* i.e., the 'Dekel,' equivalent to *Digla* or *Diglath*, probably a Semitic corruption of *Tigra*, Medo-Persic for an arrow; hence Gr. *Tigris*, the 'arrowy' stream): large river of Asiatic Turkey, rising s. of Lake Goljik, in the mountains of Kurdistan, within a few miles of the e. bend of the Euphrates (q.v.). It flows s.e. to Diarbekir, then, turning sharply, flows due e. for 100 m. to Til. Here it receives from the n. a considerable affluent, the Bitlis, and, changing its course, flows s.e. through desert wastes to the Persian Gulf, after a course estimated at 1,150 miles. Its chief tributaries, besides the Bitlis, are the Great and Little Zab, and the Dyala, all from the left, the waste land between it and the Euphrates (ancient Mesopotamia) not furnishing a single stream. At Kurna it joins the Euphrates, about 70 m. above the mouth of that river in the Persian Gulf, and the united rivers bear the name Shat-el-Arab (see EUPHRATES). In the upper part of its course, the T. is very swift, whence probably its name, and it brings down great quantities of mud. It is navigable for light freight-steamers to Bag-

dad; and above that point, for light rude boats and rafts to Diarbekir. The principal places on its banks are Diarbekir, Mosul, and Bagdad, with the ruins of Nineveh, Seleucia, and Ctesiphon.

TIKA, n. *tī'kă* [Skr.]: a mark which the Hindus make on their foreheads with the yellow dye obtained from *Euonymus tingens*, ord. *Celastrăcĕæ*.

TIKE, n. *tīk* [Sw. *tik;* Icel. *tík*, a bitch]: a dog; a cur; a selfish snarling fellow; a vulgar person; a rustic.

TILBURG, *tĭl'bėrg*, or TILBORG, *tĭl'borg:* flourishing trading and manufacturing town in the Netherlands, province of N. Brabant, 13 m. e.s.e. of Breda. The town is mentioned as early as 709; but its prosperity began with King William II., when Prince of Orange and commander of the army, taking up his headquarters at T., during the long contest which ended in the independence of Belgium. Much heath has been converted into arable and pasture lands, and numerous brick-works and woolen-cloth factories have arisen. In 1877 there were about 40 wool-spinning works with steam-power in and about T., employing about 6,000 persons. The workmen's houses have each a strip of land attached for a garden. Principal industries are weaving woolen cloth, spinning, finishing and dyeing woolen fabrics, making soap, salt, tiles, bricks, and beer. The chief buildings are the new palace, the town-house, the barracks, and the cloth-hall. T. has a high school with a course of five years, a drawing-school, and several charitable institutions. The people are nearly all Rom. Catholics.—Pop. (1879) town proper about 5,500, commune 28,390; (1887) commune 32,016; (1901) 42,334.

TILBURY, n. *tĭl'bĕr-ĭ:* a kind of carriage open at the top, named after the original maker.

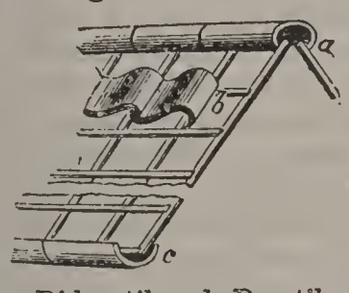
TILBURY FORT, *tĭl'bĕr-ĭ:* fortification in Essex, England; on the n. bank of the Thames, opposite Gravesend; erected in the time of Henry VIII. as a block-house, and converted (1667) into a regular fortification, of rectangular form, chiefly of brick. Its batteries command the river and the reach below.

TILDE, n. *tĭl'dā* [Sp.]: a mark (~) placed over the *n* in Spanish words to indicate that the vowel following is to be pronounced as if *y* preceded it, as *señor* = *sān'yŏr*.

TILDEN, *tĭl'dĕn*, SAMUEL JONES: statesman: 1814, Feb. 9—1886, Aug. 4; b. New Lebanon, N. Y. He entered Yale Coll. at the age of 18 years, having already won the honor of having a political address written by him adopted by the democrats as a party manifesto. He completed his college studies in the Univ. of New York, studied law, and was admitted to the bar; was elected member of the assembly 1845: as chairman of a committee to investigate the anti-rent troubles, he prepared a masterly report on leasehold and leasehold tenants. He sat in the constitutional convention of 1846. Of his law cases the most notable were that of the contested election of Azariah C. Flagg as comptroller of N. Y. city; that of the administration of the estate of Dr. Burdell (who was alleged to have

been murdered by a Mrs Cunningham: T. defended the estate against Cunningham's application for letters of administration); and the defense of the Penn. Coal Co. in the suit of the Delaware and Hudson Canal Co. for recovery of extra tolls. Thereafter, T. was at one time or another counsel for one-half the railroads of the country. He was with the free-soil bolters 1848; was candidate of the 'soft-shell' faction of the democratic party for the state attorney-generalship 1855; throughout the war maintained the sufficiency of constitutional measures for the overthrow of the rebellion. In 1868 he was the acknowledged leader of his party in the state. As leader, he strenuously opposed (1870) the enactment of the 'Tweed charter' for New York, whereby the fortunes of the city were put in the hands of a corrupt cabal. He brought about the impeachment of Judges Barnard and Cardozo, and procured their deposition from the judicial bench. He pursued the 'Tweed ring' in New York to its downfall and the conviction or voluntary exile of its chiefs. Elected gov. 1874, by a plurality of 50,000 votes over the republican candidate, he again relentlessly pursued public plunderers, the offenders in this case being the 'canal ring' of the state. At the presidential election 1876, Nov., T., as the democratic candidate, got 4,284,265 votes; his republican opponent, Rutherford B. Hayes (q.v.), 4,033,295. But the democratic house of representatives and the republican senate being irreconcilably at variance as to the electors chosen, a compromise was arranged whereby a commission of 15—5 senators, 5 representatives, and 5 supreme-court justices—was created to determine the issue. The decision reached by a majority (8) of the commission was in favor of Hayes: see ELECTORAL COMMISSION. By his last will, T. left nearly his entire estate (variously estimated $5,000,000 to $8,000,000) to trustees, to be used in founding in New York a free public library. But the will was declared invalid by the courts of the state, and only a portion of the estate went to the object designated.

TILE, n. *tīl* [AS. *tigele;* Ger. *ziegel;* F. *tuile*, a tile: L. *tegŭla*, a tile—from L. *tegĕrĕ*, to cover]: a plate or thin slab of burnt clay, flat or round, or of other form, used for roofing and for floors, walls, etc.—the finer kinds of paving-tiles are known as Encaustic Tiles (q.v.: see also MOSAIC); in *slang*, a hat: V. to cover with tiles, or as with them; in the language of *freemasonry*, to secure the door of a lodge against the entrance of the uninitiated. TIL'ING, imp.: N. act of covering with tiles; tiles collectively. TILED, pp. *tīld:* ADJ. covered with tiles; in *slang*, bound or required to keep a matter secret.



a, Ridge-tile; *b*, Pan-tile; *c*, Gutter-tile.

TILER, n. *tīl'ĕr*, a man whose occupation is to cover buildings with tiles: a brother who covers or seals the door on the outside at a lodge of freemasons—usually spelled *tyler*. TIL'ERY, n. *-ĕr-ĭ*, a work where tiles are made. TILE-

EARTH, clay suitable for making tiles. TILE-ORE, a variety of red oxide of copper, occurring massive or incrusting. DRAIN-TILES, or DRAINING-TILE (see PIPES).

TILE'STONES: uppermost group of the Silurian period, consisting of a reddish, thin-bedded, slightly micaceous sandstone, which in some places attains a thickness of 1,000 ft.; so called because capable of being split into thin layers suitable for roofing. The beds were originally considered as of Old Red Sandstone age; then as a transition group, from the Silurian strata to the Old Red Sandstone; but it is now ascertained that the fossils agree in great part specifically, and in general character entirely, with those of the underlying Upper Ludlow Rocks, and they are accordingly considered the newest group of the Upper Silurian.

TILGHMAN, *til'man*, TENCH: soldier: 1744, Dec 25—1786, Apr. 18; b. Talbot co., Md. At the outbreak of the revolution he was a merchant in Philadelphia, but was appointed lieut. of a company of light infantry; and was sec. and aide to Gen. Washington, from 1776 till the end of the war. He bore to congress Washington's dispatch announcing the surrender of Cornwallis. Congress voted him a sword and a horse with accoutrements. He was commissioned lieut.col. 1781, the rank to date from 1777, Apr. 1. After the war he was a merchant in Baltimore.

TILIACEÆ, *til-i-ā'sē-ē:* natural order of exogenous plants, of which nearly 400 species are known, mostly trees and shrubs, with a few herbaceous plants; mostly natives of the tropics, though a few are found in temperate parts of the n. hemisphere. They have simple, alternate leaves with stipules, and axillary flowers. The calyx is usually of four or five sepals; the corolla, of four or five petals. The corolla is sometimes lacking. The stamens are generally numerous, hypogynous, distinct; the outer ones sometimes abortive and petal-like. The ovary is composed of 2–10 carpels; there is one style, and the stigmas are equal in number to the carpels. As the characters somewhat correspond with those of *Malvaceæ*, so do the properties of the order, which are generally mucilaginous and wholesome, the bark fibrous. Some yield a light and useful timber, e.g., the Lime (q.v.) or Linden tree, a well-known European representative of the order, the Amer. Linden or Basswood, the White Linden of the Alleghanies, the Halmalille (q.v.) of Ceylon, the *Grewia elastica* of India, and the *Luehia divaricata* of Brazil. The *bast* of the lime-tree is valuable from its fibrous character; that of the species of Grewia is used in the same way in India, and that of all the species of *Apeiba* in S. America. The most important fibrous plants of the order, however, are the species of *Corchorus* (q.v.), which yield Jute (q.v.).

TILL, conj. *til*, or UNTIL, conj. *un-til'* [Icel. *til*, till—allied to Ger. *ziel;* OHG. *zil*, a bound, a limit]: to the time when, as, I shall wait *till* you arrive: PREP. to the time of; to the time, as *till* to-morrow; up (or down) to; as far as. TILL NOW, to the present time. TILL THEN, to some future time fixed on.

TILL, n. *tĭl* [Dut. *tillen*, to lift, to move: or perhaps from Eng. *tell*, to count]: a drawer or tray in a chest or trunk; a drawer in a desk or counter; a money-box.

TILL, v. *tĭl* [the primary meaning would seem to be 'to aim at excellence:' Ger. *zielen*, to aim at—from *ziel*, an aim: AS. *tilian*, to direct one's efforts to a purpose, to labor: Dut. *telen*, to cultivate]: to prepare land for seed and to raise and dress crops; to cultivate: N. [Scot. *till*, a cold unproductive clay] a Scotch and geological term for the stiff unstratified clays of the boulder formation, but loosely applied to any thick unstratified alluvia (see BOULDER-CLAY: PLEISTOCENE). TILL'ING, imp.: N. culture; tillage. TILLED, pp. *tĭld*. TILLER, n. *tĭl'lẽr*, one who tills. TIL'LABLE, a. *-lă-bl*, capable of being tilled; arable. TIL'LAGE, n. *-lāj*, the art or practice of preparing land for seed and raising crops; culture. TILTH, n. *tĭlth*, cultivated land; culture; the surface soil turned over by the plow, in which the crops root. TILLY, a. *tĭl'lĭ*, having the character of till or cold unproductive clay.—SYN. of 'tillage': husbandry; farming; agriculture; culture; cultivation.

TILLAND'SIA: see BROMELIACEÆ.

TILLEMONT, *tē-yĕh-mōng'*, SÉBASTIEN LE NAIN DE: ecclesiastical historian: 1637, Nov. 30—1698, Jan. 28; b. Paris; son of Jean le Nain—the title De T. being derived from a small estate of his family, near Vincennes. He was educated at Port Royal, where he early imbibed serious and rigorous views of the spiritual life. His theological studies from his youth were marked by a spirit of patient and thorough inquiry into the writings of the Fathers, especially of the apostolic Fathers. With scrupulous conscientiousness, he hesitated long in the choice of a profession; but at last was ordained deacon 1673, and priest 1676. He was at his estate of Tillemont 1679–81, then visited Arnauld and the other Jansenist refugees in Holland and the Low Countries. He was induced 1682 to undertake a parochial charge—St. Lambert—but held it only a short time.

During these years, he had been steadily pursuing his historical studies and preparing his great Church History. Being under suspicion from his Jansenist sympathies, he divided his work, and was thus enabled to print the first part without referring it to the censorship, under the title *Histoire des Empereurs* (6 vols. 4to 1690). The success of this work disarmed the opposition of the church authorities; and eventually his Church History appeared under the title *Mémoires pour servir à l'Histoire Ecclésiastique des six Premiers Siècles*, 16 vols. 4to (1693–1712), the last 12 vols. after his death. The *Emperors* comprises all the reigns from Augustus to Anastasius (518); the *Histoire Ecclésiastique* comes down to about the same period. The plan of both is much the same, being in great part a compilation of the original writers, as far as possible in their own words, but arranged with great skill and judgment, and with such explanations and chain of narrative (within brackets) as is requisite for a connected recital. Both these monumental works have maintained to this day their reputation for learning and impartiality. His other works in manuscript

were largely used as materials by later compilers; indeed, his authorities have largely supplied materials for the church histories compiled since his time.—Tillemont died at Paris.

TILLER, n. *tĭl'lėr* [Dut. *tillen,* to lift]: the bar or lever by which the rudder of a vessel is worked (see HELM); in *prov. Eng.,* the handle of a spade; in *OE.,* the stalk of a cross-bar. TILLER-ROPE, the rope which forms the communication or connection between the rudder and the wheel.

TILLER, v. *tĭl'lėr* [AS. *tilga;* Dut. *telghe,* a branch, a shoot]: to send up a number of new shoots from a root. TIL'LERING, imp. TIL'LERED, pp. *-lėrd.* TIL'LERS, n. plu. *-lėrz,* shoots or sprouts springing from a root or stump; the young trees left to stand when a wood is felled.

TIL'LETT, WILBUR FISK, A.M., D.D., LL.D., S.T.D.: American Methodist theologian: b. Henderson, N. C., 1854, Aug. 25. He was graduated from Randolph-Macon College in 1877 and from Princeton Theological Seminary in 1880. He held a pastorate at Danville, Va., 1880-2, and has been professor of systematic theology at Vanderbilt University since 1884 and vice-chancellor there from 1886. He has published *Hymn Studies* (1889); *Discussions in Theology* (1890); *Personal Salvation* (1902); *The Doctrines of Methodism* (1903); *A Statement of the Faith of Worldwide Methodism* (1906); etc.

TILLEULENSPIEGEL: a series of stories collected and first published in Low Dutch, in the year 1483. The hero of them, whose first name was Till or Thyl, was a traveling buffoon, who, besides presenting farces and the like, was a practical joker. The name of Eulenspiegel probably comes from a picture or coat of arms which he left after perpetrating a joke, which consisted of an owl (Eule) and a mirror (Spiegel), and which is to-day shown, on what is said to be his gravestone, in Luneburg. These stories have been translated into all the European languages. Consult Simrock, *Ein kurzweilig Lesen von Till Eulenspiegel nach den ältesten Quellen* (1878).

TILL'MAN, BENJAMIN RYAN: American politician: b. Edgefield co., South Carolina, 1847, Aug. 11. He was educated at Bethany Academy, but studies were interrupted by the Civil war, in which he took part as a Confederate officer until a serious illness compelled his retirement. At the close of the war he rose to prominence in the political activities of his state, and during the years of reconstruction was actively interested in its educational advancement. He founded the Clemson Agricultural and Mechanical College at Calhoun's old home, Fort Hill, and also the Winthrop Normal and Industrial College at Rock Hill. He enlisted

the agricultural interests, and in 1890 and again in 1892, being supported by the 'Farmers' Alliance,' he was elected governor of South Carolina. In 1895, again in 1901, he was elected to the United States Senate.

TILLMAN, Samuel Escue: American soldier and author: b. near Shelbyville, Tenn., 1847, Oct. 2. He was graduated from West Point in 1869, and assigned to frontier duty. In the following year he was called to West Point as assistant professor of chemistry, and was later appointed professor of mineralogy and geology. He continued to teach in the Military Academy for many years. In 1874-5 he served as a member of the United States expedition to Tasmania to witness the transit of Venus. He is the author of *Essential Principles of Chemistry* (1884); *Elementary Mineralogy* (1894); *Important Minerals and Rocks* (1900); etc.

TILLODON'TIA: a group of extinct mammals, chiefly of the North American Eocene rocks. They were large plantigrade, five-toed land animals, whose skeleton presents characters intermediate between those of *Carnivora* and *Rodentia*. The brain is small and slightly furrowed. The dentition was complete, and marked by large, rodent-like incisors. A prominent genus was *Tillotherium*.

TILLOTSON, *tĭl'ot-son*, John, D.D., Archbishop of Canterbury: 1630, Oct.—1694, Nov. 24; b. Sowerby, Yorkshire; son of a zealous Puritan, a clothier. During his course at Cambridge he had the friendship of Cudworth, More, Rust, Smith, Wilkins, and other scholars. In 1656 he became private tutor in the house of Edmund Prideaux, of Ford Abbey, Devonshire, Oliver Cromwell's attorney-general. When or by whom Tillotson was ordained, is not known, but he was a preacher 1661—attached apparently to the Presbyterian party in the Church of England, for at the famous Savoy Conference he was present on the Presbyterian side; but he submitted at once to the Act of Uniformity (1662); and in 1663 he was appointed to the rectory of Keddington in Suffolk; but almost immediately after was chosen preacher at Lincoln's Inn, where his mildly evangelical, earnestly practical, but undoctrinal morality was at first little relished: 'Since Mr. Tillotson came,' said the benchers, 'Jesus Christ has not been preached among us.' Soon, however, the graces of his character manifested themselves, and his popularity increased. In 1664 he published a sermon *On the Wisdom of Being Religious;* and 1666 *The Rule of Faith,* in reply to a work by an English clergyman, Sargeant, who had gone over to the Church of Rome. In 1670 he was made a prebend of Canterbury. Two years later he was promoted to a deanery; and in 1680 published a sermon, *The Protestant Religion Vindicated from the Charge of Singularity and Novelty,* in which he advanced the proposition—untenable by a Protestant—that 'no man is at liberty to

affront (i e., to attack) the established religion of a nation, though it be false. This proposition he subsequently abandoned. With Burnet, he attended Lord Russell during his imprisonment for complicity in the Ryehouse Plot; and on the accession of William III. rose high into favor. In 1689 he was appointed clerk of the closet to the king; and 1691 was raised to the see of Canterbury, vacant by deposition of Sancroft (q.v.), after vainly imploring William to spare him an honor which he foreboded would bring him no peace. Nor was he mistaken in his painful presentiment. The non-juring party (see NON-JUROR) pursued him with unrelenting rage to the end of his life—three years later; but their animosity extracted neither murmur of complaint nor retaliation from the tolerant primate. A collected ed. of his *Sermons* was published after his death by his chaplain, Dr. Barker, and has been frequently reprinted; the best ed. is by Birch, 10 vols. 1820. They were translated into German by Mosheim; and were long highly popular for their clear, solid, and refined thought, their easy eloquence, their evident candor, their humane and moral piety. T.'s life was written by Dr. T. Birch (Lond. 1752).

TILLY, *til'lē*, JOHANN TSERCLAES, Count of: one of the greatest captains of the 17th c.: 1559, Feb.—1632, Apr.; b. at the chateau of Tilly in Brabant. A pupil of the Jesuits, and intended for the priesthood, his natural sternness inclined him to enter fully into their extreme ideas; and this bent of mind was fixed by the examples of Alba (q.v.) and Requesens, under whom—having decided on the life of a soldier—he was initiated into the art of war in the Low Countries. After distinguished service in Hungary against the Turks, he was appointed 1609 by Duke Maximilian of Bavaria to reorganize his army, but resigned this post to take command of the Rom. Cath. army at the outbreak of the Thirty Years' War (q.v.); and with Duke Maximilian gained 1620 the battle of Prague, which dissipated the ambitious dreams of the elector palatine. During this war, he separated, by able strategy, the armies of Mansfeld and of the Markgraf of Baden, beat the latter at Wimpfen, and expelled Christian of Brunswick from the Palatinate 1622, defeating him at Höchst 1622, and at Stadion 1623—the latter desperate conflict lasting three days. Created a count of the empire, he was next opposed to the king of Denmark, whom he conquered at Lutter 1626, and, in conjunction with Wallenstein, compelled to sign the shameful treaty of Lübeck 1629. In 1630 he succeeded Wallenstein as commander-in-chief of the imperial forces, and took by storm the town of Magdeburg 1631, May 10. The frightful atrocities which he allowed the Croats and Walloons of his army to perpetrate on this occasion have affixed to his otherwise high reputation a foul blot, ineffaceable by apology. May 14 he made a solemn entry into the ruined city, attended the celebration of a *Te Deum* in the cathedral, and then sent to the emperor a dispatch in which occurs the passage: 'Since the capture of Troy, and the destruction of Jerusalem, a victory such as this has never been seen!' From this time, fortune deserted him; for his next

opponent was Gustavus Adolphus, for whom T. was no match, and who completely routed him at Breitenfeld 1631, Sep. 17; and though, in the following spring, he gained minor successes over the Swedish general Horn, the king speedily drove him behind the Lech in Bavaria, and (Apr. 5) forced the passage of the river right in his front, after a desperate conflict, in which T. was mortally wounded. He was removed to Ingolstadt, where he died. T. was victor in 36 battles, and was reckoned the best general of the time till his defeat by the Swedish king: he was small in stature, and of meagre habit of body, with a stern and energetic countenance. Sober and continent, a despiser of luxury and wealth, of such simplicity of character that he refused the emperor's offer to make him a prince, he supported the Rom. Cath. party entirely from a sincere devotion, and with a fanatical zeal.

TILLY-VALLY, *tĭl'lĭ-văl'lĭ* [perhaps a hunting phrase borrowed from the French: Steevens derives it from L. *titi, villitium*, a very small trifle, a bagatelle: the etymology is quite uncertain]: in *OE.*, an interjectional phrase expressive of contempt for trifling or impertinent observations; bosh; nonsense; also spelled TILLY-FALLY.

TIL'-SEED: see SESAMUM.

TILSIT, *til'sĭt:* commercial town of Prussia, province of Prussia, on the left bank of the Memel or Niemen, 60 m. n.e. of Königsberg; in a fruitful district, called the T. Flat. It has broad streets and a cleanly appearance. Its castle and town-hall are the chief buildings. It has active transit-trade with Russia, besides considerable trade in timber, corn, butter, cheese, and Russian products; and has paper, sugar, and oil mills. T. is memorable for the treaties there signed 1807, between France and Russia July 7, and France and Prussia July 9; constituting the Peace of Tilsit. By the treaty of July 7, Napoleon agreed to restore to the king of Prussia a great portion of his dominions, his Polish acquisitions being joined to Saxony (see POLAND), and his possessions w. of the Elbe formed into the nucleus of the new kingdom of Westphalia: moreover, Danzig was declared an independent city; the Prussian province of Bialystok was ceded to Russia; the dukes of Oldenburg and Mecklenburg, the czar's relatives, were reinstated by Napoleon, and, in return, the Bonapartist kings of Naples and Holland were recognized by the czar; etc.—By the treaty of July 9, the king of Prussia recognized the kings of Holland, Naples, and Westphalia, and the Confederation of the Rhine; and agreed to the cessions laid down in the Russian treaty, and to other minor alienations and concessions to Saxony, amounting in all to nearly one-half of his dominions; to the exclusion from his harbors of the commerce of Great Britain, and to the occupation of the Prussian fortresses by the French, till the payment of an enormous ransom. The importance of the alterations effected by this treaty—though its provisions register the depth of Prussia's degradation by Napoleon—is dwarfed before the startling magnitude of the *secret provisions* signed between France and Russia. By these were arranged the resigning of the em-

pire of the East to Russia—Roumelia and Constantinople being specially excepted by Napoleon—and the acquisition of the Spanish peninsula by France; the two powers were to make common cause against Great Britain, and were to force the three courts of Stockholm, Copenhagen, and Lisbon to join them; and Napoleon agreed to increase no further the power of the duchy of Warsaw, and to do nothing which might lead to re-establishment of the Polish monarchy. By a further agreement, not put formally into writing, the mouths of the Cattaro, the Ionian Isles, Sicily, Malta, Egypt, and the papal dominions were to be taken by France; and Greece, Macedonia, Dalmatia, and the Adriatic coasts, on the partition of Turkey; while, on the other hand, Russia was to obtain the rest of Turkey, and was allowed to seize Finland. These secret articles are given on excellent authority, and their correctness is further evinced by the conduct of France and Russia for the next few years.—Pop. about 35,000.

TILT, v. *tĭlt* [AS. *tealt*, unsteady, tottering: Icel. *tölta*, to tilt: Sw. *tulta*, to waddle]: to ride at each other with blunt lances; to joust; to fight; to rush, as in combat; to fall or lean, as to one side; to throw to one side; to incline; to place in a sloping position: N. inclination forward, backward, or to one side; a sloping position; an exercise in which mounted combatants charge at each other or at a target with blunt lances; a thrust. TILT'ING, imp.: N. inclination forward; the act of one who or that which tilts, as in a trial of arms or as a disputant; formerly, a military pageant in which combatants on horseback assailed each other with couched or levelled lances; the process by which blistered steel is rendered ductile. TILT'ED, pp.: ADJ. levelled, as in a tilting-match; raised up on end or edge. TILT'ER, n. *-ẽr*, one who tilts. TILTED UP, in *geol.*, thrown up or inclined at a high angle. TILT-HAMMER, a large hammer set in motion by machinery, and lifted or tilted by projections or wipers on the axis of a wheel, used in the manufacture of iron and steel. TILT-YARD, an inclosed space for tilts or tournaments.

TILT, n. *tĭlt* [Icel. *tjald*, a tent, a curtain: Dan. *telt;* Sw. *tält;* Ger. *zelt*, a tent: Sp. *tolda*, an awning]: a covering overhead; the canvas covering of a cart or wagon; an awning of canvas extended over the stern-sheets of a boat: V. to cover with an awning. TILT-WAGON, a covered wagon.

TILTH: see under TILL 3.

TILTON, *tĭl'ton*, JAMES, M.D.: physician: 1745, June 1—1822, May 14; b. Kent co., Del. He was educated at the Nottingham, Md., Seminary; graduated in medicine at the Univ. of Penn. 1776, and began practice, but at the outbreak of the revolution entered the military service as lieut. Soon he was appointed surgeon of a Del. regt., and was in the battles of Long Island and White Plains, and in the retreat to the Delaware. By his exertions the army medical and hospital service was much improved. He was made surgeon-gen. of the army 1812, and personally inspected the hospitals on the n. frontier.

TIL'TON, THEODORE: editor and author: b. New York, 1835, Oct. 2; d. 1907. He graduated at the College of the City of New York 1855; was assistant editor of the N. Y. *Observer,* and 1856-71 connected with the N. Y. *Independent,* of which he was for a while ed.-in-chief. Subsequently he began and for two years conducted the *Golden Age.* For many years he was a lyceum-lecturer. His name became notorious by his connection with the scandalous charges brought against Henry Ward Beecher. Among his writings were *The Sexton's Tale and Other Poems* (1867); *Sancta Sanctorum, or Proof Sheets from an Editor's Table* (1869); *Tempest Tossed,* a romance (1873); *Thou and I,* poems (1880); *Suabian Stories,* ballads (1882); *The True Church* (1883).

TIMBAL, n. *tĭm'băl* [F. *timbale;* Sp. *timbal;* It. *timballo,* a kettle-drum—from Ar. *tabl*]: a kind of kettle-drum; one of certain species of insects which make noises by the rapid movements of folded membranes (called *timbales, tĭm'băl-ēz*) in a cavity on the under part of the abdomen.

TIMBER, n. *tĭm'bėr* [AS. *timber,* building material. Goth. *timrjan,* to build: Ger. *zimmer,* building material. Dut. *timmer,* all materials of a building: Icel. *timbr;* Dan. *tömmer,* wood for building]: wood fit for building purposes (see TIMBER TREES); the trunk of a tree; the main beams of a building; one of the upright pieces of a ship's frame: ADJ. furnishing timber; made of or used for timber: V. to furnish with timber. TIM'BERING, imp.: N. timber materials. TIM'BERED, pp. *-bėrd:* ADJ. furnished with timber; wooded. TIM'BERS, n. plu. *-bėrz,* the upright ribs, based on the keel and rising to the gunwale, on which the planking of a vessel is fastened (see SHIP-BUILDING). TIMBER-HEAD, in a *ship,* the top end of a timber rising above the gunwale. TIMBER-TREE, tree whose wood is fit for use as timber. TIMBER-WORK, work made of timber or wood. TIMBER-YARD, a place where timber is kept; a lumber-yard.

TIMBER TREES: trees valuable for their timber, which is used for construction. They belong to many widely different nat. orders, all, however, orders of Phanerogamous plants; the only Cryptogamous plants which assume the form of trees being the Tree Ferns (q.v.). Of Endogenous plants, the only timber-trees are some of the Palms (q.v.); the only other endogens, indeed, which can be called trees being a very few of the *Liliaceæ,* e.g., the Dragon-tree (see DRAGON'S BLOOD). Of Gymnogens, the *Coniferæ* are in general of considerable value for timber, and some, e.g., the different kinds of Fir and Pine, are largely used for building purposes. A far greater number of timber-trees, however, are true exogens—as the Oak, Ash, Elm, Birch, Maple, Poplar, Whitewood, Beech, Catalpa, Cedar, Chestnut, and Walnut,

among those of temperate regions; and the Mahogany, Rosewood, and Teak, of tropical countries. The most valuable timber trees of different countries are noted in the articles on these countries; for trees belonging to particular nat. orders, see the titles of these orders: the most valuable kinds are described in separate articles. For the cultivation of timber trees, see ARBORICULTURE. Some trees of comparatively small size are valuable for the quality of their timber, which is used for veneering, turnery, or for wood-engraving. Others, as the apple and cherry, which are valuable principally for production of fruit, are useful also for timber; the former being used for making weavers' shuttles, and the latter for making furniture.

Timber-trees, in Law, such trees as are used in building and in the mechanic arts—e.g., oak, ash, elm, beech, chestnut, walnut, cedar, fir, lime, aspen, sycamore, birch. As a general rule, timber trees, whether standing or fallen, are part of the realty of an estate, and are embraced in a mortgage of the land; they pass to the purchaser in a judicial sale under a mortgage. But local conditions modify the operation of the principles of law: thus, in a new country abounding in forest, the removal of the standing timber, so far from being a damage, may be esteemed rather a benefit. See WASTE.

TIMBRE, n., or TIMBER, n. *tĭm'bĕr* [F. *timbre,* a clock-bell, crest—from L. *tympănum,* a drum, a timbrel]: the crest on a coat of arms; in *music,* the characteristic quality of sounds of the same pitch and loudness when produced by two different instruments or voices, by which they are distinguished from each other.

TIMBREL, n. *tĭm'brĕl* [Sp. *tamboril,* a drum; *timbal,* a kettle-drum (see TABOR)]: small drum, like a tambourine, having bells round the rim. TIM'BRELLED, a. *-brĕld,* sung to the sound of the timbrel.

TIMBUKTU, *tĭm-bŭk'too,* French Sudan: a celebrated trading station situated on the great bend of the Niger river, on the s. border of the Sahara, in lat. 16° 43′ n., and lon. 2° 57′ w. The city lies in a desert region about 9 m. from the banks of the river. It measures 3 m. in circumference, and consists of adobe houses without windows. In the centre are three large mosques, and on the n. outskirts two forts. The commerce by caravans across the Sahara was formerly enormous, is still considerable, and again increasing. The trade is chiefly in ostrich feathers, rubber, salt, cotton, tobacco, sugar, and gold. Recent excavations have disclosed ancient Egyptian architecture pointing to a prehistoric foundation. The modern city was founded toward the end of the 11th c., and became known to Europeans in 1373. Owing to its former difficulty of access Timbuktu was long an object of curiosity for travelers. The French took possession of

it in 1893. Pop. about 12,000, almost all Mohammedans. Consult Dubois, *Timbuctoo, the Mysterious* (1896).

TIMBY, Theodore Ruggles: American inventor: b. Dover, Dutchess co., N. Y., 1822, Apr. 5. He early showed inventive powers, 'was an inventor from childhood,' says Parton, and at 16 invented the floating dry dock. Among his other inventions are those of floating batteries of iron and steel for coast-defense; a method of sighting and firing heavy guns by electricity, patented in 1862 at Washington, afterward adopted by the United States government, and now used in all leading countries; the American turbine wheel; the first portable barometer; the process of printing terrestrial globes in colors; and a process for quickly ripening coffee. He was the first to advocate the modern use of iron in the construction of warships, and his most famous invention is the revolving turret which was first introduced in the original Monitor, and has since been adopted in naval architecture throughout the world. This invention, through official neglect and other failure to recognize and proclaim Timby's contribution to the national defenses that gave victory in 'the battle upon which hinged the fate of the civil war,' has been wrongly ascribed to John Ericsson, chief engineer of the Monitor. But the true history of the case shows that as early as 1841 Timby exhibited at the war department a model and plans of a revolving battery, to be made of iron, the idea of which was suggested to him when first he observed the circular form of Castle William on Governor's island, New York harbor. In 1843 he made his first record of the model and plans in the United States patent office. From 1851 to 1861 he urged their importance upon the Emperor Napoleon III., but without practical result. Meanwhile, having developed improvements in his invention, he took out patents under which he entered into an agreement with the builders of the Monitor, including Ericsson, for its use in the construction of that vessel, and received therefor $5,000. He also received $5,000 royalty for each of the two subsequent vessels built by that company.

Although this American inventor has received no compensation and no official recognition of his services to the country, his claims have not been officially disputed. His invention of the revolving turret, as well as of the 'Timby system' of coast-defense, adopted by many nations, has been acknowledged by military and naval authorities at home; the legislature of New York passed (1890) a concurrent resolution declaring it to be the 'duty of congress to make such investigation . . . as shall do ample justice in the premises and vindicate the genius that contributed so largely in rescuing the country from a grave peril during the darkest days of its existence'; and influences are at work in congress and elsewhere to secure full acknowledgment of his patent rights and remuneration for his work from the United States govern-

ment. Among his writings is a volume entitled *Lighted Lore for Gentle Folk* (1902), which contains his reflections on a variety of subjects.

TIME, n. *tīm* [Icel. *timi;* Dan. *time;* Sw. *timme,* hour, season, time: Goth. *gatiman;* Ger. *ziemen,* to be fit or becoming: F. *temps;* It. *tempo;* L. *tempus,* time]: duration; a particular portion of duration, past, present, or future; any space or measure of duration, as an hour, a day, a month; period; interval; life or duration (see SPACE AND TIME); repeated performance; season; completion of the time, as of pregnancy; state of things at a particular period, as good *times;* the present state of things, as distinct from eternity; repetition or addition of one more; in *gram.,* tense; in *music,* (1) the relative duration of musical sounds as measured by the rhythmical proportion of the different notes, a minim being half of a semibreve; a crotchet, half of a minim; a quaver, half of a crotchet, etc. (see RHYTHM); (2) the division into measures or bars, and the division of each measure into equal parts, and subdivision of these parts —the different combinations of sounds inuto equal measures and values being said to form different kinds of time, each indicated by a distinct rhythmical signature; (3) the degree of movement—that is, the absolute and not relative velocity, which is now more generally expressed by the Italian word *Tempo* (q.v.), as quick *time,* slow *time.* TIME, v. to adapt to the occasion; to do at the proper time or season; to regulate as to time; to note the time of; to keep time. TI'MING, imp. TIMED, pp. *tīmd,* adapted to the season or occasion. TI'MIST, n. *-mĭst,* one who keeps good time. TIMELY, a. *tīm'lĭ,* seasonable; opportune; sufficiently early: AD. early; soon; in good season. TIME'LINESS, n. *nĕs.* TIME'LESS, a. *lĕs,* done at an improper time. TIME'LESSLY, ad. *-lĭ.* TIMEOUS, a. *tī'mŭs,* not too late; timely. TIMEOUSLY, ad. *tī'mŭs-lĭ,* in proper time. ABSOLUTE TIME, time reckoned for all places by some common epoch, and irrespective of local standards or epochs.

TIME, COMPUTATION OF: there have been methods of computing time known to man since the day when he first became wise enough to devise a calendar. Some of these have been based upon the lunar, some upon the solar system, and, though some have been more perfect than others from the astronomical point of view, each has answered its purpose in enabling the people to keep pace with the passage of the seasons as well as in aiding them to compile those records of events that have proved of so much value to the historian.

There are several methods of computing time still in use, even in the United States. The method of reckoning most generally relied upon is known as 'Standard' time, this being the standard of time adopted for commercial convenience in the United States and Canada, just as Greenwich time has been adopted in England; Paris time

in France, etc. In opposition to this we have what is known as 'Mean Solar' time and 'Apparent Solar' time. The former, which is also designated as 'Local' time, is determined by the passage of the mean sun over the particular meridian of that place, while 'Apparent Solar' time is the measure depending upon the *apparent* position of the sun at noon. The former is the time indicated by the well-regulated clock or watch that has been set to true time. The latter is the time indicated by a properly constructed sun-dial. The difference between the two may amount to as much as 16 minutes and 21 seconds, and the process of finding the extent of the difference is known as the *Equation of Time.*

In addition to these, we have 'Astronomical' time, which is the mean solar time reckoned from noon through the 24 hours; 'Equinoctial' time, or the mean longitude of the sun according to Delambre's tables, converted into time at the rate of 360 degrees to the tropical year; 'Greenwich' time, which is the time reckoned from the moment of the sun's passage over the meridian of Greenwich, Eng.; and 'Nautical' time, which is the same as astronomical time, except for the fact that the date of the day agrees with ordinary time for the morning hours, whereas, in astronomical time, it is in the afternoon hours that the date agrees with ordinary time.

The Hour and Day.—According to modern methods of computation, the day is divided into 24 hours, each comprising exactly 360 seconds, or 60 minutes. This division into hours is said to have originated in 293 B.C., when L. Papirius Cursor erected the first sun-dial in Rome. This was located in the Temple of Quirinus, and attracted great attention.

Up to 158 B.C., when the clepsydra, or water-clock, was introduced by Scipio Nasica, this was the only method of telling time known to the Romans. After the adoption of the newer invention, however, the hours were called in the streets by public criers employed for that purpose. In other European countries the methods used in reckoning time were even more uncertain. Thus, in England, King Alfred, in 886 A.D., introduced the measurement of time by candles. If one candle burned 3 in. an hour was said to have elapsed, and the burning of six candles marked the passage of the 24-hour day. It was not all nations that divided the day into 24 hours, however. The early Egyptians divided the 24 hours into two parts, one being the 12-hour day; the other, the 12-hour night, and this custom was adopted by both Jews and Greeks.

By modern reckoning the period known as 'one day' represents the interval between two consecutive transits of a fixed star over a specified meridian, or the period taken by the earth in making one absolute revolution upon its axis. This is known as a 'Sidereal' day, and it differs from the 'Apparent Solar' day—the interval between two consecutive transits of the sun over a fixed

meridian—as the length of the latter varies from day to day by reason of the variable motion of the earth in its orbit, and the inclination of this orbit to the equator.

Although it is now customary in the United States, as well as in most of the countries of Europe, to reckon the 24-hour day from midnight to midnight, this has not always been the case, nor is this method followed in all parts of the earth. The ancient Babylonians calculated their civil day from sunrise to sunrise; the Umbrians, from noon to noon, and the Athenians from sunset to sunset, a method which was adopted by the Hebrews, and to which the orthodox Jews still adhere. Today, the Chinese divide their day into 12 parts of 2 hours each, while, in some places in Italy, the day is still reckoned from sunset to sunset, the clocks being arranged to strike the 24 hours round.

The so-called 'Astronomical' day begins at noon, and is also divided into 24 consecutive hours, instead of being in two parts of 12 hours each. The 'universal day,' however, was fixed at the Prime Meridian Conference, in Washington, 1884, Oct. 21, as a mean solar day, beginning, for all the world, at the moment of mean midnight of the initial meridian, coinciding with the beginning of the civil day, and that meridian to be counted from zero up to 24 hours.

In starting at Greenwich, or at 0° longitude, time changes at the rate of one hour for each 15 degrees, and, in traveling completely round the earth, or through its 360 degrees, a day of 24 hours seems to be either lost or gained, being lost if one is moving from east to west, and gained in going from west to east. To obviate this difficulty, the International Date Line, as it is called, has been established. This extends from north to south through the Pacific Ocean, and it corresponds generally with the 180th meridian. In crossing this line from the east going westward, therefore, one day is added, or Sunday instantly becomes Monday; in crossing it from the west, in sailing eastward, the day is subtracted, and Sunday immediately becomes Saturday. It is for this reason that the day is said to begin at this line.

The Week and Month.—It is generally supposed that the division of time into weeks of 7 days each originated among the Jews, who were the first people to observe a Sabbath on every seventh day. In fact, the custom has practically been confined to Hebrew and Christian people, and is supposed to have been derived from the belief that the world was created in six calendar days, which were followed by another, or day of rest, which corresponds to the Jewish Sabbath, or the Christian Saturday. The present names that are applied to the several days of the week were never used by the Hebrews, however, nor by the ancient Greeks, and, although they have come to us directly from the Saxon, it is not difficult to trace them back to the Romans. Thus, according to Saxon nomenclature, Monday was Moon's Day; Tuesday, Tiwa's

Day; Wednesday, Woden's Day; Thursday, Thor's Day; Friday, Friga's Day; Saturday, Saturn's Day, and Sunday, Sun's Day.

According to the general acceptance of the term the word 'month' is used to represent the twelfth part of a calendar year. This division, however, is entirely arbitrary, and the definition is but one of many to which the word applies. Thus, in addition to this, or the *calendar* month, we have the following:

Solar Month.—One-twelfth part of the *tropical year,* or 30 days, 10 hours, 29 minutes, 3.8 seconds.

Lunar Month.—The interval between one new moon and the next, or, to be more exact, 29.530589 days, 12 hours, 44 minutes, 2.7 seconds. This is also known as the *synodical* month.

Sidereal Month.—The interval required to complete the moon's revolutions from a fixed star back to the same again, or 27 days, 7 hours, 43 minutes, 11.5 seconds.

Tropical Month.—The period required for the moon to pass through 360 degrees of longitude, as from one vernal equinox to the next. In time, 27 days, 7 hours, 43 minutes, 4.7 seconds.

Anomalistic Month.—The mean period of the revolution of the moon from one perigree to the next, or 27 days, 13 hours, 18 minutes, 37.4 seconds.

Nodical Month.—The interval between two successive passages of the moon through its rising node, or 27 days, 5 hours, 5 minutes, 36 seconds. This is also known as the *dracontic* month.

The last four months are used chiefly by astronomers, and only the first two are put to anything like general use.

The Year.—As now reckoned, the year comprises twelve calendar months, and consists of about 365 calendar days. It is this year, which extends from Jan. 1 to Dec. 31, that is customarily used in the reckoning of time. It is believed that it was the Egyptians who first fixed the length of the year. It was introduced to the Romans by Romulus, in 738 B.C., and was corrected by Numa Pompilius in 713 B.C. The year of Romulus comprised 10 months, or 304 days, but as this was not only considerably shorter than either the solar or the lunar year, and did not correspond with any fixed season, Numa reformed it by the addition of two months, and so it remained until 46 B.C., when Julius Cæsar corrected it still further by fixing the solar year at 365 days and 6 hours, and making every fourth year bissextile, or a leap-year, of 366 days. He also changed the beginning of the year from Mar. 1 to Jan. 1. Thus, the average length of the Julian Year was 365¼ days, which was too long by 11 minutes and 14 seconds. To overcome this difficulty, Pope Gregory XIII. introduced the Gregorian Calendar in A.D. 1582. By this the year consists of 365 days, while every year that is exactly divisible by 4, and every centurial year divisible by 400, contain 366

days, a division of time that retains but a very slight error. In 1584 the difference between the Julian and the new calendar was 10 days. Since that time, however, 3 more days have accumulated, so that the Russian and Greek Church calendar, which is still reckoned by the former method, is now just 13 days later than that in use in the United States, and in nearly all Europe.

In exact figures, the mean Gregorian year consists of 365 days, 5 hours, 49 minutes, and 12 seconds. Thus, it differs from all other years, as may be seen by the following enumeration:

Solar Year.—One complete mean apparent circuit of the ecliptic by the sun, or 365 days, 5 hours, and 48 minutes.

Lunar Year.—Twelve lunar months, or 354 days, 8 hours, 48 minutes, 36 seconds.

Sidereal Year.—The revolution of the sun to the same place in relation to the fixed stars, or 365 days, 6 hours, 9 minutes, 9.3 seconds.

In addition to the Gregorian Calendar, other methods of computing the year are still in general use. The Hebrew year, for example, is a lunisolar year, composed of either 12 or 13 months, each consisting of 29 or 30 days. In each cycle of 19 years, the 3rd, 6th, 8th, 11th, 14th, 17th, and 19th years contain 13 months, and are called 'embolismic' months. The other years comprise but 12 months.

The Mohammedans have a pure lunar year of 12 months, composed of 29 and 30 days, alternately. The 2nd, 5th, 7th, 10th, 13th, 16th, 18th, 21st, 24th, 26th, and 29th years in each cycle of 30 years are those in which the last month contains 30 days instead of 29.

The Chinese year is also figured by the lunar method, each of the 12 months beginning with the advent of the new moon. To provide for the difference between the lunar and the solar years, one month is added in every 30.

Standard Time.—For commercial purposes, but primarily for the convenience of the railroads a standard of time for the United States was established by mutual agreement in 1883. In accordance with this system, the territory extending from 65° to 125° w. longitude, is divided into four time sections, each of 15 degrees of longitude—exactly one hour—so arranged that 7.5° fall on each side of each meridian commencing with the 75th. Thus the first, or Eastern Division, includes all the territory between the Atlantic Coast and an irregular line drawn from Buffalo to Charleston, S. C. The second, or Central Division, embraces all the territory between this eastern line and another irregular line drawn from Bismarck, N. D., and the mouth of the Rio Grande. The third, or Mountain Division, covers all the territory between this last line and nearly the western borders of Idaho, Utah, and Arizona. The fourth, or Pacific Di-

vision, includes all the territory between the western border of the Mountain Division and the Pacific Ocean.

Although, as has been suggested, the standard of time was originally little more than a convenience for the transportation companies, its use has now become so general that people throughout the United States have found it equally convenient to regulate their own affairs by the same standard.

To find standard time of places by the following table, find the mean local time at the point desired, and add or subtract, as suggested:

PLACE	Time Division	Add or Subtract Minutes	PLACE	Time Division	Add or Subtract Minutes
Albany, N. Y.	East.	— 5	Fort Wayne, Ind.	Cent.	— 20
Austin, Tex.	Cent.	+ 31	Galena, Ill.	Cent.	+ 2
Baltimore, Md.	East.	+ 6	Galveston, Tex.	Cent.	+ 19
Baton Rouge, La.	Cent.	+ 4	Grand Haven, Mich.	Cent.	— 15
Bismarck, N. D.	Cent.	+ 43	Harrisburg, Pa.	East.	+ 7
Boston, Mass.	East.	— 16	Houston, Tex.	Cent.	+ 21
Buffalo, N. Y.	East.	+ 16	Huntsville, Ala.	Cent.	— 12
Burlington, Ia.	Cent.	+ 5	Indianapolis, Ind.	Cent.	— 16
Cairo, Ill.	Cent.	— 3	Jackson, Miss.	Cent.	+ 1
Charleston, S. C.	East.	+ 20	Jacksonville, Fla.	Cent.	— 33
Chicago, Ill.	Cent.	— 10	Janesville, Wis.	Cent.	— 4
Cincinnati, Ohio	Cent.	— 22	Jefferson City, Mo.	Cent.	+ 9
Cleveland, Ohio	Cent.	— 33	Kansas City, Mo.	Cent.	+ 19
Columbia, S. C.	East.	+ 24	Keokuk, Ia.	Cent.	+ 6
Columbus, Ohio	Cent.	— 28	Knoxville, Tenn.	Cent.	— 24
Dayton, Ohio	Cent.	— 23	La Crosse, Wis.	Cent.	+ 5
Denver, Col.	Mt.	———	Lawrence, Kas.	Cent.	+ 21
Des Moines, Ia.	Cent.	+ 14	Lexington, Ky.	Cent.	— 23
Detroit, Mich.	Cent.	— 28	Little Rock, Ark.	Cent.	+ 9
Dubuque, Ia.	Cent.	+ 3	Louisville, Ky.	Cent.	— 18
Duluth, Minn.	Cent.	+ 9	Lynchburg, Va.	East.	+ 17
Erie, Pa.	Cent.	— 39	Memphis, Tenn.	Cent.	———
Evanston, Ind.	Cent.	— 10	Milwaukee, Wis.	Cent.	— 8
Fort Gibson, Okla.	Cent.	+ 21	Mobile, Ala.	Cent.	— 8
Fort Smith, Ark.	Cent.	+ 19	Montgomery, Ala.	Cent.	— 15
Nashville, Tenn.	Cent.	— 13	Sante Fe, N. Mex.	Mt.	+ 4
New Haven, Conn.	East.	— 8	Savannah, Ga.	Cent.	— 36
New Orleans, La.	Cent.	———	Shreveport, La.	Cent.	+ 15
New York, N. Y.	East.	— 4	Springfield, Ill.	Cent.	— 2
Norfolk, Va.	East.	+ 6	St. Joseph, Mo.	Cent.	+ 19
Ogdensburg, N. Y.	East.	+ 2	St. Louis, Mo.	Cent.	+ 1
Omaha, Neb.	Cent.	+ 24	St. Paul, Minn.	Cent.	+ 12
Pensacola, Fla.	Cent.	— 11	Superior City, Wis.	Cent.	+ 8
Philadelphia, Pa.	East	+ 1	Syracuse, N. Y.	East.	+ 5
Pittsburg, Pa.	East.	+ 20	Toledo, Ohio	Cent.	— 26
Portland, Me.	East.	— 19	Trenton, N. J.	East.	— 1
Providence, R. I.	East.	— 14	Utica, N. Y.	East.	+ 1
Quincy, Ill.	Cent.	+ 6	Washington, D. C.	East.	+ 8
Raleigh, N. C.	East.	+ 15	Wheeling, W. Va.	East.	+ 23
Richmond, Va.	East.	+ 10	Wilmington, Del.	East.	+ 2
Rochester, N. Y.	East.	+ 11	Wilmington, N. C.	East.	+ 13
Rock Island, Ill.	Cent.	+ 3	Yankton, S. D.	Cent.	+ 29
San Francisco, Cal.	Pac.	+ 10			

Time Differences.—The following table exhibits the differences in time between the principal places in the

several foreign countries and United States Standard Time:

It is at—	When it is 12:00 o'clock noon according to United States Standard Time.				At London	At Paris
	In the Eastern Division	In the Central Division	In the Mountain Division	In the Pacific Division		
Aden, Arabia	8:00 P M	9:00 P M	10:00 P M	11:00 P M	3:00 P M	2:51 P M
Amsterdam, Holland	5:20 P M	6:20 P M	7:20 P M	8:20 P M	12:20 P M	12:11 P M
Athens, Greece	6:35 P M	7:35 P M	8:35 P M	9:35 P M	1:35 P M	1:26 P M
Berlin, Germany	5:54 P M	6:54 P M	7:54 P M	8:54 P M	12:54 P M	12:45 P M
Bombay, India	9:51 P M	10:51 P M	11:51 P M	12:51 A M	4:51 P M	4:42 P M
Bremen, Germany	5:33 P M	6:33 P M	7:33 P M	8:33 P M	12:33 P M	12:24 P M
Constantinople, Turkey	6:56 P M	7:56 P M	8:56 P M	9:56 P M	1:56 P M	1:47 P M
Copenhagen, Denmark	5:50 P M	6:30 P M	7:50 P M	8:50 P M	12:50 P M	12:41 P M
Dublin, Ireland	4:35 P M	5:35 P M	6:35 P M	7:35 P M	11:35 A M	12:26 A M
Hamburg Germany	5:40 P M	6:40 P M	7:40 P M	8:40 P M	12:40 P M	12:31 P M
Havre, France	5:00 P M	6:00 P M	7:00 P M	8:00 P M	12:00 M	11:51 A M
*Hong-Kong, China	12:37 A M	1:37 A M	2:37 A M	3:37 A M	7:37 P M	7:28 P M
Honolulu, Hawaii	6:29 A M	7:29 A M	8:29 A M	9:29 A M	1:29 A M	1:20 A M
Liverpool, England	4:48 P M	5:48 P M	6:48 P M	7:48 P M	11:48 A M	11:39 A M
London, England	5:00 P M	6:00 P M	7:00 P M	8:00 P M	.....	11:51 A M
Madrid, Spain	4:45 P M	6:45 P M	6:45 P M	7:45 P M	11:45 A M	11:36 A M
*Manila, Philippine Islands	1:04 A M	2:04 A M	3:04 A M	4:04 A M	8:04 P M	7:55 P M
*Melbourne, Australia	2:40 A M	3:40 A M	4:40 A M	5:40 A M	9:40 P M	9:31 P M
Paris, France	5:09 P M	6:09 P M	7:09 P M	8:09 P M	12:09 P M	.....
Rome, Italy	5:50 P M	6:50 P M	7:50 P M	8:50 P M	12:50 P M	12:41 P M
Stockholm, Sweden	6:12 P M	7:12 P M	8:12 P M	8:12 P M	1:12 P M	1:03 P M
St. Petersburg, Russia	7:01 P M	8:01 P M	9:01 P M	10:01 P M	2:01 P M	1:52 P M
United States:						
†Eastern Division	.....	1:00 P M	2:00 P M	3:00 P M	7:00 P M	6:51 P M
†Central Division	11:00 A M	.....	1:00 P M	2:00 P M	6:00 A M	5:51 A M
†Mountain Division	10:00 A M	11:00 A M	.....	1:00 P M	5:00 A M	4:51 A M
†Pacific Division	9:00 A M	10:00 A M	11:00 A M	.....	4:00 A M	3:51 A M
Vienna, Austria	6:06 P M	7:06 P M	8:06 P M	9:06 P M	1:06 P M	12:57 P M
*Yokohama, Japan	2:19 A M	3:19 A M	4:19 A M	5:19 A M	9:19 P M	9:10 P M

* The morning of the next day.

† To find the "division" of any prominent place in the United States see "Time Division" column in "United States Standard Time" table.

TIM'GAD, Algeria: the ancient Roman city THAMUGADI, in the department of Constantine, near Lambèze, a few m. e. of Batna on the Philippeville-Biskra railroad, is approached through a valley bounded by the Aures Mountains, and stands on the northern fringe of the African desert. It was a fortified frontier town at the junction of six roads, and was founded in 100 A.D. by Lucius Munatius Gallus. It flourished for three centuries, and then underwent various vicissitudes, owing to native insurrections and the incursions of the Vandals, in 535 being partially destroyed. Four years later, under

the Byzantine general Solomon, it was restored and had another period of prosperity until the Arab invasion of 646, when the Christian governor Gregory of Timgad was defeated and killed, the town being subsequently abandoned, falling into ruins, and gradually becoming buried beneath the desert sands. Recent excavations undertaken by the French government, have revealed ruins, which for beauty, architecture, and magnificent extent, have gained for Timgad the title of the 'African Pompeii.' Nearly the whole of the city has been laid bare and exhibits the usual Roman platting, two main streets, the Decumanus Maximus extending e. and w., and the Cardo Maximus intersecting at right angles, upon and around which the city was built. The principal buildings are on the main streets, and among the prominent civic features are the magnificent triumphal arch of Trajan, the Forum, with the theatre, basilica, and other buildings surrounding it, the Temple of Jupiter Capitolinus, statues of the Roman emperors, a Byzantine fort, the Christian basilica and cathedral erected by Gregory, the governor already mentioned, houses and stores, markets and annexes, thermæ, and latrinæ. The arch of Trajan, the finest Roman construction of its kind in northern Africa, and the dominating attraction of Timgad, bears an inscription which translated reads:

'The Emperor Cæsar Nerva Trajan Augustus Germanius, son of the divine Nerva, sovereign pontiff, four times tribune, three times consul, father of his country, founded the Marcian colony, Trajan of Thamugadi, by the help of the third Augustus Legion, Lucius Munatius Gallus being the legal imperial proprietor.'

The epigraphic wealth of the city is considerable, including inscriptions to early Christians, showing that they were persecuted and underwent martyrdom, while others bear such historical names as Novatus, a member of the Council of Carthage in 258; Sextus in 320; Faustinius, opponent of Gaudentius the Donatist, in 411; and Secundus, bishop of Numidia, exiled by Huneric in 484.

TIMID, a. *tĭm'ĭd* [F. *timide*—from L. *timĭdus*, faint-hearted, cowardly—from *timĕō*, I am afraid of: It. *timido;* Gael. *tiom*, timid]: faint-hearted; wanting courage to meet danger or difficulty, real or imaginary; timorous; shy. TIM'IDLY, ad. *-lĭ*. TIM'IDNESS, n. *-nĕs*, or TIMIDITY, n. *tĭ-mĭd'ĭ-tĭ* [F. *timidité*]: want of courage or boldness to face danger; habitual cowardice. TIMOROUS, a. *tĭm'ėr-ŭs* [L. *timor*, fear]: full of fear or scruples; fearful of danger. TIM'OROUSLY, ad. *-lĭ*. TIM'OROUSNESS, n. *-nĕs*, fearfulness.—SYN. of 'timid': fearful; timorous; afraid; cowardly; pusillanimous; retiring; shrinking.

TIMOCRACY, n. *tī-mŏk'ră-sĭ* [Gr. *timē*, honor work; *kratĕō*, I govern]: a form of government in which the possession of a certain amount of property is a necessary qualification for office. TIMOCRATIC, a. *tī'mō-krăt'ĭk*, pertaining to timocracy.

TIMOLEON.

TIMOLEON, *tĭ-mō'lē-on:* great Greek general, and the liberator of Sicily from the dominion of 'tyrants': about B.C. 394-337; b. Corinth; of one of the noblest families. Timoleon's brother, Timophanes (whose life Timoleon had saved on the field of battle) having made himself a military despot in his native city, was killed in Timoleon's presence and without his objecting; and opinion was divided in Corinth as to the merit of this deed, one party extolling it as an act of noblest patriotism, while the other demanded Timoleon's death as a murderer. The expedient was adopted of sending Timoleon away as leader of a small band of mercenaries (B.C. 344) to Syracuse, whose exiled citizens had begged assistance from Corinth, the mother city, against the 'tyrant' Dionysius and the Carthaginians. Outwitting the Carthaginians, Timoleon arrived safely at Tauromenium, where he was welcomed by the Syracusian exiles. Hicetas, 'tyrant' of Leontini, was then striving to dispossess Dionysius and secure the tyranny of Syracuse for himself, and had succeeded in getting possession of the whole city except the island citadel. Timoleon, with only a fifth of the opposing number, defeated him at Adranum; and marching to Syracuse, made himself master of two quarters of the city. From this time Timoleon's career in Sicily was one of victory over all opponents. Dionysius the Younger, B.C. 343, surrendered in despair the citadel of Syracuse, and was sent to Corinth. Hicetas, having failed in the attempt to assassinate Timoleon, called in the assistance of a Carthaginian force of 50,000 men, which, however, was soon withdrawn by Mago, who had become suspicious of treachery. Hicetas at last fled to Leontini, leaving Timoleon sole master of Syracuse. After repeopling the almost desolate city by recalling exiles, and inviting new colonists from Greece, Italy, and Sicily, he spent the next two years in enacting laws and organizing a constitution, which he put on a completely democratic footing. The Carthaginians, alarmed at the reviving power of Syracuse and the prospect of union among the Sicilian Greeks, sent an army of 80,000, under Hasdrubal and Hamilcar, to subdue the whole island. Timoleon, with only 12,000, encountered them (B.C. 339) on the Crimissus, and gained one of the greatest victories ever won by Greeks over barbarians. He then proceeded with his great project of expelling the tyrants of the other Greek cities, who, however, again called in the aid of the Carthaginians; but the successes of Timoleon soon made the Carthaginians glad to conclude a treaty, fixing the river Halycus as the boundary between their dominions and those of the Greeks. Hicetas, tyrant of Leontini, being now captured, was put to death with his wife and daughters; and shortly afterward Mamercus of Catana suffered the same fate. Timoleon thus in about six years freed Sicily from nearly all its tyrants, and conferred upon the cities free constitutions, himself taking no advantage of the immense influence which he thus

obtained. After his great work was accomplished, he lived among the Syracusans as a private citizen, receiving from them and from all the Greek world the greatest honor and respect: his advice was sought in his old age by all the Sicilian cities in any emergency. He was buried in the market-place of Syracuse, where a monumental gymnasium, called the Timoleonteum, was afterward erected over his tomb. Timoleon was undoubtedly one of the greatest generals and noblest characters in Grecian history.

TIMON, *tī'mon*, THE MIS'ANTHROPE: Athenian cynic in the time of the Peloponnesian war (B.C. 431-404). The little that is known concerning him is learned chiefly from Aristophanes and other comic writers who attacked him. Disgusted with mankind, on account of the ingratitude of his early friends and companions, he lived a life of almost total seclusion, his only visitor being the 'bold and insolent' Alcibiades. Numerous stories were current in antiquity regarding his eccentricities. His grave, on the sea-shore, is said to have been planted with thorns, and to have been rendered inaccessible by the sea forming it into a small island.—Plutarch gives a short notice of Timon's life in his biography of Mark Antony, from which Shakespeare probably got his knowledge of Timon, whom he presents as being of essentially generous nature, and falling into his misanthropy through his absolute lack of discrimination.

> We know him out of Shakespeare's art,
> And those fine curses which we spoke—
> The Old Timon with his noble heart,
> That, strongly loathing, greatly broke.
>
> TENNYSON.

This Timon must be distinguished from the Greek poet and philosopher of the same name, who lived about a century and a half later.

TIMONEER, n. *tī-mŏn-ēr'* [F. *timonier*, a helmsman; *timon*, a helm—from L. *tēmo*, a beam, a pole]: in *OE.*, a helmsman.

TIMOR, *tē-mōr':* an island of the Malay Archipelago, the most eastern of the Lesser Sunda Islands, 700 m. s.e. of Borneo; length, 300 m.; width, 60 m.; area, 12,450 sq.m. The coasts are steep, and generally difficult of access on account of coral reefs; the island is traversed by a mountain chain everywhere giving evidence of volcanic origin; the interior is very little known. The vegetation is less luxuriant and less varied than in the other islands of the East Indies. The coast lands are cultivated to some extent, the northern part of the island being more favorable to agriculture than the southern. Coffee, rice, sugar, and cocoanuts are grown, but mostly for domestic use only; some coffee is exported, also sandalwood, wax, trepang and tortoise shell. Horses and cattle are raised, and a few exported. There is considerable mineral wealth, but it has not been developed. The people

are partly Malays, and partly Negritos, with a few Chinese, who control the trade. The island politically is divided between Portugal and Holland.

TIMORLAUT, *tē-mōr'lowt:* a group of islands of the Malay Archipelago, lying between Timor Island on the s.w. and the Aru Islands on the n.e., s.w. of New Guinea. The group consists of Yamdena (or Timerlaut), Selaru, Larat, Vordate, Molu, and Maro, and a number of small uninhabited islands. The larger islands are hilly, the maximum elevation being 820 ft.; the others are low and flat, of coral formation. Agriculture is carried on in a primitive fashion; some cattle are raised; turtle fishing is an industry of some importance, and turtle and trepang are exported.

TIMOTHEUS, *tĭ-mō'thē-ŭs:* Greek dithyrambic poet: b. 357 B.C. He was the most famous lyric poet of his day and introduced a chorus in singing the Nome (Νόμος) and mimetic action to give spirit to the rendering of that song or melody. A collection of fragments of his poems are to be found in Bergk's *Poetæ Lyrici Græci.*

TIMOTHEUS: Athenian general: b. about the end of the 5th century; d. Chalcis in Eubœa, 354 B.C. In 378 he was made commander of the fleet sent out by the Athenian Confederacy to gain the alliance of the Peloponnesian cities, and of those along the coast of Laconia, and defeated a Spartan fleet in 375. Peace having been declared with Sparta, he was recalled to Athens. In 372, having been sent to the coast of Asia Minor to aid the satrap of Phrygia, he secured the island of Samos, and by the further acquisition of Sestus and Crithote gained for Athens the control of the Hellespont. In 356 he was appointed, with Chares and Iphicrates, to the command of an expedition against Byzantium, but, refusing to engage in a battle in what he deemed an unpropitious moment, he was accused by Chares of causing the Athenian defeat, and was deposed from power.

TIMOROUS, etc. See under TIMID.

TIMOTHY: kind of grass. See HERD'S GRASS.

TIMOTHY, *tĭm'o-thĭ,* FIRST AND SECOND EPISTLES TO: two of the three Pastoral epistles of the apostle Paul—the third being the Epistle of Titus. The date and place of their writing are not known; but their thought and diction, consistent with their purpose, indicate that they belong to a later period than the other Pauline epistles, when new heresies had appeared, and a more systematic organization of the church had become necessary. The external evidence for their genuineness is very strong, yet has not satisfied all scholars. They occur in the Muratorian Canon and the Peshito version as writings of St. Paul; Eusebius classes them among the *homologoumena* (universally accepted as authentic); while, still earlier, Irenæus, Tertullian, and others of the Fathers quote them as authoritative. On the other hand, Tatian,

one of the earliest Fathers, denies their genuineness, as did also Marcion, Basilides, and most of the Gnostic heretics. Origen speaks of some who rejected Timothy II., on account of the mention of 'Jannes and Jambres,' two apocryphal characters; while, in modern times, Schleiermacher and Neander admit the Pauline origin of Timothy II., and endeavor to disprove the genuineness of Timothy I. Eichorn, De Wette, Baur, and others go further, and attempt to prove unauthentic all three Pastoral epistles, considering the language and mode of thought distinct from the Pauline, and (particularly Eichhorn) finding no period in the apostle's life to which they could be properly fitted in. But, while such arguments have had weight with a number of writers, the general verdict of biblical scholarship remains in accord with ancient and undeniable tradition—maintaining the authenticity and apostolic authority of these epistles.—They consist of a series of warnings against false doctrine, exhortations, and directions as to procedure in the church.—See the 'Introductions' of Alford, Wordsworth, Davidson, Wiesinger, Hug; and the list of commentators on the 'Pastoral Epistles,' appended to the article on the Epistle of TITUS.

TIM'OTHY, or TIMOTHEUS, *tĭ-mō'thē-ŭs* [Gr. *timō,* I honor; *theos,* God]: companion of Paul the apostle: b. about A.D. 20, in Lycaonia, Asia Minor; son of a Greek father and a Christian mother, Eunice, and instructed by her and her mother, Lois, in the Holy Scriptures. Paul on his second missionary tour (Acts xvi.) found Timothy at Derbe or Lystra; from that time he became the apostle's beloved and devoted assistant, amanuensis, and messenger to the churches; and his name is even coupled with Paul's in the beginning of five important epistles, as if co-author. He was with the apostle in Rome, but afterward was deputed by Paul to represent him in superintending the church at Ephesus, where he was addressed by Paul in two epistles—Timothy I., II. All that is known of him subsequently is that he had been 'set at liberty' (Heb. xiii. 23) after imprisonment. The Book of Acts has been ascribed to him improbably, the 'we' (Acts xx. 4-5) referring to another. His admirable character was such that Paul addressed him as 'my beloved son.'

TIMOTHY-GRASS, *tĭm'ŏ-thĭ* [after *Timothy* Hanson, who cultivated it extensively in Maryland and was the first to bring it into notice, about 1780]: the *Phlĕum praten'sĕ,* ord. *Gramin'ĕæ,* a valuable fodder-grass, extensively cultivated in both Great Britain and America; same as Herd's Grass (q.v.).

TIM'ROD, HENRY: American poet: b. Charleston, S. C., 1829, Dec. 8; d. Columbia, S. C., 1867, Oct. 6. After study at the University of Georgia and some legal education, he was for a time a tutor, at the outbreak of the civil war became war correspondent of the Charles-

ton *Mercury,* and in 1864 was made assistant editor of the *South Carolinian* at Columbia. The destruction of Columbia by Sherman was the ruin of his occupation, and his subsequent career was unfortunate. Just previous to the war-time, Timrod and P. H. Hayne were brilliant members of that Southern literary coterie in which W. G. Simms was the most prominent. In 1860 a small volume of his poems appeared, but with little recognition. Done under unfavorable conditions, Timrod's poetry has many excellent qualities, and in some cases attains real elevation. Among his best pieces are *At Magnolia Cemetery; Charleston,* and *The Cotton Boll.* A memorial to him was placed in Washington Square, Charleston, in 1901. His verse was collected and published, with a biographical sketch, by Hayne in 1873. An edition, with memoir, in 1899, was followed in 1901 by the so-called memorial edition.

TIMUQUOMAN FAMILY: a group of American Indians formerly occupying central and northern Florida. In 1527—when first known to the Spaniards—these Indians had some 50 settlements along the Saint John's River. There were five original tribes speaking as many dialects. Wars of other tribes and the inroads of the English from Carolina gradually reduced the tribes in numbers, and they fled to Volusia county, at the headwater of the Saint John's. The territory thus abandoned was afterward occupied by the Seminoles (q.v.).

TIMUR, *tē-moor'* (TIMUR BEG, TIMUR LENG, TAMERLANE, the latter a corruption of Timur Leng, 'Timur the Lame'), Mongol conqueror: b. Kesh, near Samarcand, about 1336; d. Otrar, 1405. He was a descendant of Genghis Khan, and became chief of his tribe in 1370, having previously reigned jointly for some years with his brother-in-law Hussien, of whom he became jealous and whom he put to death, after defeating him in a short civil war. He established a firm government in his dominions, and then embarked on his career of conquest. He subdued Persia and the whole of central Asia from the Great Wall of China to Moscow, and in 1398 invaded India, which he mastered from the Indus to the mouth of the Ganges. His cruelty knew no bounds. On one occasion, it is recorded, he massacred 100,000 prisoners, while on the banks of the Ganges he was called by the Emperor of the East and other princes to aid in repelling the Turks under Bajazet. He wrested Syria from the Mamelukes on his return journey, overran the sultan's dominions with his vast army, and on June 20, 1402, met Bajazet on the plain of Angora, routed his immense army, and took him prisoner. In 1404 he began preparations for an expedition into China, and early in 1405 began the advance which was stopped by his death. Timur, however, was not a mere barbarian. He was an able administrator, with many statesmanlike traits, a patron of science and art, and is also reputed to have been an author, though on dubious evidence. The prin-

cipal authority for the life of Timur is Sherif-ed-Din-Ali's *History* (in Persian), translated into French by Pétis de la Croix, under the title *Histoire de Timur-Bec, connu sur le nom du grand Tamerlan* (4 vols. Par. 1722). Several writings are extant, in Persian, attributed to Timur, but are of doubtful authenticity. Among these are the *Institution* (with Eng. transl. and valuable index, Oxford 1783); and the *Commentaries* of Timur, transl. from a MS. of Major Davy by Major Stewart. See also a translation of the narrative of Clavijo, envoy of Henry III. of Castile to Timur, by C. R. Markham (Hakluyt Soc. 1860); and Howorth's *History of the Mongols* (1880).

TIN, n. *tĭn* [Sw. *tenn;* Dan. and Icel. *tin;* Ger. *zinn,* tin: W. *ystaen:* L. *stannum*]: an elementary body: a white, soft, and very malleable metal (see below); thin plates of iron covered with a coating of tin; a dish made of tinned-iron plate; in *slang,* money: V. to cover with a coating of tin; to overlay with tinfoil; to preserve in tin cases, as fruit, meat, etc. TIN'NING, imp.: N. the art or process of covering plates of iron, or the inner surfaces of iron or copper vessels, etc., with a coating of tin; the layer or coating thus put on; the canning of meat, fruit, etc. TINNED, pp. *tĭnd,* covered with tin; preserved in a tin case, as meat, etc. TINNY, a. *tĭn'nĭ,* abounding with or resembling tin: N. in *Scot.,* a cup made of tinned sheet-iron. TIN'NER, n. *-nẽr,* one who works in a tin-mine; a tinsmith. TIN'FOIL [L. *fŏlĭum,* a leaf]: tin in thin leaves. TIN'MAN, one who makes or sells articles made of tinned sheet-iron. TIN'MINE, a mine producing tin ore. TIN'PLATE, thin sheets of iron coated with tin (see below). TIN PYRITES, a sulphuret of tin, copper, and iron—a mineral of a steel-gray or sometimes of copper-yellow color. TINSMITH, one who manufactures articles of tinned sheet-iron. TIN-STONE, or -ORE, the oxide of tin or *cassiterite,* the ore from which the tin of commerce is obtained. TIN'TYPE, a photograph taken on tin. TIN'WARE, iron articles coated with tin; utensils made of tin-plate. BLOCK-TINS see under BLOCK. STREAM-TIN, the gravel-like tin ore found with detritus in the gullies and water-courses of metalliferous districts.

TIN (symb. Sn., at. wt. 118, sp. gr. 7.3): a silvery-white metal, with a tinge of yellow, and high metallic lustre. It posses a crystallized texture, and may be obtained in well-formed crystals of the pyramidal or tetragonal system; and because of this crystalline texture a bar of tin, when bent, emits a creaking sound, termed the *cry* of tin (the *Zinngeschrei,* or tin-shriek of the Germans). Tin is a soft metal—being softer than gold—and is very malleable, and can be beaten out into very thin laminæ, in which form it is known as *tinfoil.* At temperature of about 212° F. its ductility is considerable, but not remarkable, and it may be then easily drawn into wire of moderate tenacity—a wire with diameter 0.17 of an inch being broken by a weight of 50 lbs. It is a moderately

good conductor of heat and electricity, and when handled communicates a peculiar odor to the skin. At ordinary temperatures, it is very slightly acted on by exposure to the air, or to moisture, or to both. At the temperature of 392° F. it becomes so brittle that it may be powdered; it melts at 455° F.; heated above melting point, it oxidizes rapidly, being converted into dioxide, a whitish powder called 'putty-powder,' used in the arts for polishing. T. is attacked and dissolved by hydrochloric acid, with evolution of hydrogen; by nitric acid it is converted into a white hydrate of the dioxide.

There are two principal oxides of tin—the monoxide or Stannous oxide, SnO or Sn_2O_2, and the dioxide or Stannic oxide, SnO_2: there is also a sesquioxide, Sn_2O_3 or $SnO.SnO_2$.

The monoxide of T., or stannous oxide, SnO, is produced by heating stannous oxalate in a closed vessel, or by igniting stannous hydrate: the hydrate, $2SnO.H_2O$, is obtained as a white precipitate by decomposing stannous chloride with an alkaline carbonate, carbon dioxide being at the same time evolved. The monoxide acts as a base, forming salts which are colorless, redden litmus, and are for the most part soluble in water, from which crystalline tin is deposited on an inserted mass of zinc, constituting the so-called *Tin Tree*. None of these salts are of special importance. *Dioxide of T.*, or stannic oxide, SnO_2, occurs native in the anhydrous form, crystallizing in square prisms sufficiently hard to scratch glass, and generally of brown color from the presence of peroxide of iron or of manganese. It forms two hydroxides: Stannic acid $SnO_2.H_2O$, and Metastannic acid, $Sn_5O_{10}.5H_2O$. *Stannic acid* is precipitated by acids from solutions of alkaline stannates, and from solution of stannic chloride by calcium or barium carbonate. It dissolves in the stronger acids, forming the stannic salts: thus with sulphuric acid it forms stannic sulphate, $Sn(SO_4)_2$. With the alkalis, stannic acid forms easily soluble salts, from which the insoluble stannates of the earth-metals and heavy metals may be obtained by precipitation. The stannate of sodium, Na_2SnO_2, is used as a mordant in calico-printing. *Metastannic acid* is produced by action of nitric acid on tin. Dried in air at common temperatures, its composition is $5SnO_2.10H_2O$; but at 212° F. it gives off 5 molecules of water, and is reduced to $H_{10}Sn_5O_{15}$. It is a white crystalline powder insoluble in water and in acids; dissolves slowly in alkalis, forming the metastannates, e.g., Potassium metastannate, $K_2H_8Sn_5O_{15}$, and Sodium metastannate, $Na_2H_8Sn_5O_{15}$. The metastannates exist only in the hydrated state, being decomposed when deprived of their basic water

There are two chlorides of T.—viz., a dichloride and a tetrachloride. The *Dichloride of T.*, or stannous chloride, $SnCl_2$, may be obtained in a hydrated form by dissolving the metal in hot hydrochloric acid, and evaporating the solution, when the salt crystallizes in prismatic needles, having the composition $SnCl_22H_2O$. The hydrated proto-

chloride is used as a mordant, and for deoxidizing indigo and the peroxides of iron and manganese, by the dyer and calico-printer; and for its deoxidizing or reducing powers, it is sometimes employed in analytical chemistry, especially in determination of the quantity of mercury, since all the mercurial salts, when boiled with it, are decomposed, and yield their mercury in the metallic form. *Tetrachloride of T.*, or stannic chloride, $SnCl_4$, forms, with the chlorides of the alkali metals and alkaline earth-metals, crystalline double salts, called *Stannochlorides* or *Chlorostannates*, e.g., $SnCl_4.2NH_4Cl$; $SnCl_4.BaCl_2$, etc.; the compound of this nature which it forms with chloride of ammonium is represented by the formula $CnCl_4.2NH_4Cl$, and is employed by the dyer under the technical term *Pink Salt*. An impure tetrachloride, prepared by dissolving T. at a gentle heat in a mixture of nitric acid and sal-ammoniac, and known in the trade as *Nitromuriate of Tin*, or *Composition*, is also largely used by dyers and calico-printers. Trichloride of gold, added to dilute solution of stannous chloride, produces a brownish-purple precipitate known as *Purple of Cassius*.

The sulphides of T. are three—the monosulphide, the sesquisulphide, and the bisulphide. The *Bisulphide of T.* SnS_2, may be obtained in the hydrated state, in the form of a dingy yellow precipitate, by passing hydrogen sulphide through a solution of stannic chloride. In the dry way, it is procured in the form known as Mosaic Gold, which is insoluble in any acid, though soluble in aqua regia; and is employed in the arts to give an appearance of bronze to the surface of metals.

Reduction and Manufacture.—Tin must have been one of the metals earliest known, as it enters into the composition of Bronze (q.v.), of which the most ancient metallic weapons and tools were made. Tin and oysters were the earliest products for which Great Britain was famous. Tin is still largely obtained in Cornwall; and from that locality the Phœnician navigators took it to Tyre and Sidon. To this day, England is by far the greatest tin-producing country, having raised (1894) over 13,700 tons of dressed ore, or 8,800 tons of the metal. Minor T. ore deposits in Europe exist in the Erzgebirge (Germany) Brittany (France), Galicia (Spain). Also, in the Malay peninsula and in Queensland and New S. Wales (Australasia), in Bolivia and Peru (S. America), and in the region of the Black Hills (United States), T. ore is found.

In the report of the Geological Survey office on the mineral resources of the United States, 1888, the following analyses of different tin ores are given.

I. CASSITERITE FROM THE BLACK HILLS, DAK.

Mines.	Stannic Oxide.	Insoluble.	Specific Gravity.
Occidental	96·42 = 75·86 tin	3·58	6·923
Tin Mountain.....	97·5 = 76·7 tin	...	6·923
First Find.....	94·70 = 74·5 tin	...	6·728

II. COMPARATIVE ANALYSES OF CASSITERITE.

Localities.	Stannic Oxide.	Specific Gravity.
	Per cent.	
Finbo, Sweden	93·6	...
Wicklow, Ireland	95·26	6·75
Xeres, Mexico	89·43	6·862
Tipuani, Bolivia	91·80	7·021
Zinnwald	88·04	...
California	76·15	...
Cornwall	98·93	...
Schlackenwald	99·28	...

There is but one ore of tin of any importance—viz., the dioxide, or stannic oxide, SnO_2, which in its pure state consists of tin 78 and oxygen 22: it is called Tin-stone or Cassiterite. Tin ore has nothing remarkable in its appearance; it is of various colors—e.g., gray, various shades of yellow and red, and black. Its specific gravity—a notable feature—is 6·9; and it strikes fire with steel. In Cornwall, the tin ore occurs in mineral veins running through granite and slate rocks, or scattered in crystals through their mass. The tin-stone obtained from the veins or lodes is called *Mine-tin;* that procured by washing alluvial deposits is called *Stream-tin*—the latter is the result of disintegration of granite and other rocks which contained veins of tin. Washed Cornish tin ore, usually called 'black tin,' pro-

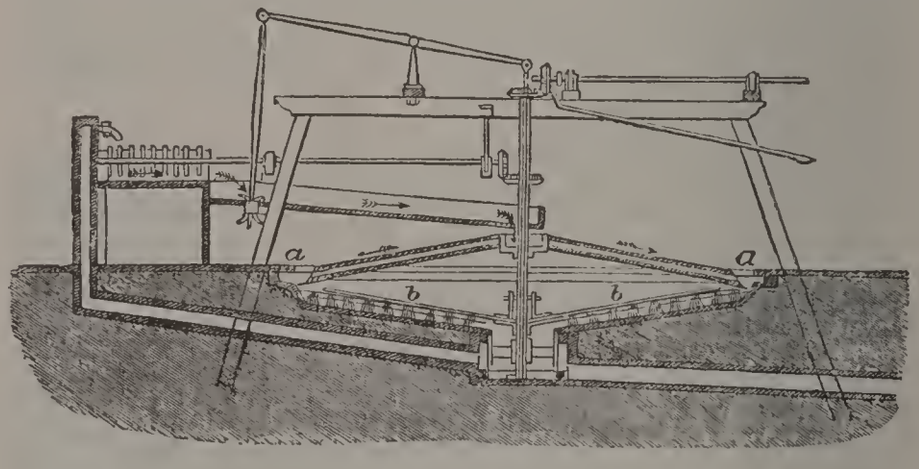


Fig. 1.

duces on an average about 67 per cent. of metallic or 'white' tin. Tin pyrites, or sulphide of tin, is found in some of the Cornish mines, but it is of little importance commercially. Ores containing copper are sometimes found with so large proportion of tin that it is difficult to say whether they should be regarded as tin or copper ores.

The dressing of tin ore obtained from the mine is a difficult and delicate operation. It is so much dispersed through the gangue that it requires to be stamped to a very fine powder (for the apparatus, see METALLURGY) before the metallic particles can be effectually separated. In some mines, the proportion of oxide to the rest of the material is not so much as 10 lbs. to the ton.

The stamped ore is copiously supplied with water passed through a grating adjoining the stamps, and conveyed into a channel where there are two pits. The purer and heavier portion falls into the first, and is called the *crop;* the remainder, called the *leavings*, passes through the first, and is retained in the second pit. Repeated washings are now necessary to separate as thoroughly as possible the impurities from the ore, and for this purpose a machine called a *buddle* is largely employed. Various kinds of apparatus are used, but they are similar in principle to the jigging sieve and sleeping table (see METALLURGY). The form of buddle, known as 'Borlase's Buddle,' effects a saving of about 30 per cent. Figs. 1 and 2 show this machine. The ore and earthy matters, in the state of thick mud, are conveyed by square pipes or channels to the circumference *a*, *a*, around which, by aid of water, the metallic portion separates, while the lighter stony impurities flow toward the centre, and are carried away. There are brushes at *b*, *b*, for agitating the ore during the operation. In the older form of buddle, this action is reversed, and the machine, instead of being depressed, is raised in the centre.

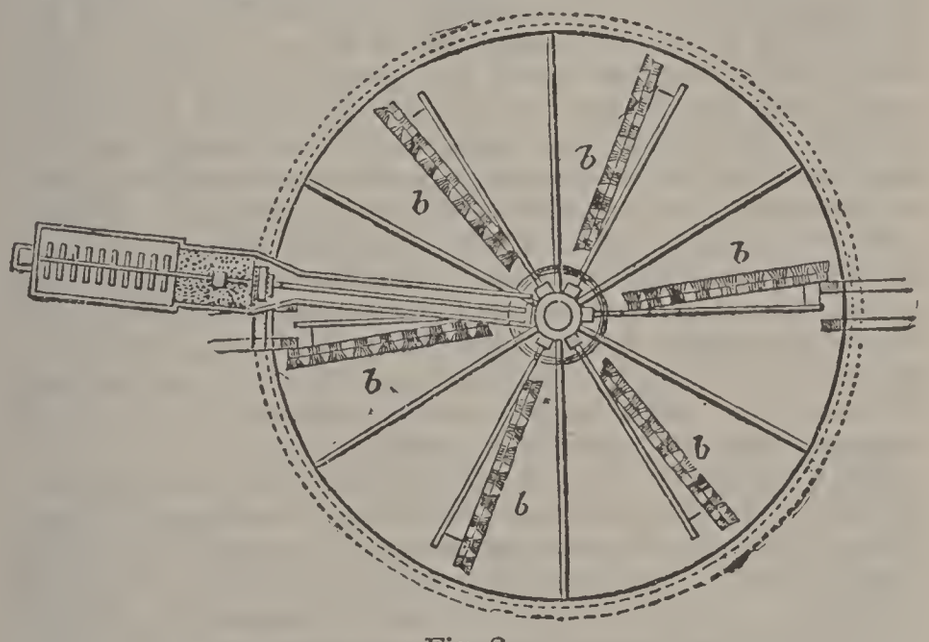


Fig. 2.

The tin ore thus far purified has next to be deprvied of its sulphur and arseuic; this is done in a Reverberatory Furnace (q.v.), the flues of which are connected with large condensing chambers, in which the arsenic is deposited in a crystalline from (see ARSENIC), and is afterward resublimed, to form the white arsenic of commerce. The sulphur, present in the state of sulphide of iron, is decomposed by the heat into sulphurous acid gas, and the remaining oxide of iron is removed by a subsequent washing. Sulphide of copper, when present, is converted by roasting, and afterward exposing it to the air, into sulphate of copper, and is then easily dissolved out by lixiviation.

After this final washing, the ore is ready for smelting in a reverberatory furnace. The charge consists of from 20 to 25 cwts. of ore mixed with one-sixth of its weight of

powdered anthracite or charcoal, and a small quantity of lime or fluor-spar, to serve as a flux for the siliceous impurities. Before being put into the furnace the mixture is moistened with water, to prevent the finely powdered ore being carried away by the draught. When the charge is placed on the hearth of the furnace, the doors are closed, and the heat gradually raised for about six hours; the oxide is then reduced by the carbon of the coal. At this stage, the furnace-door is opened, and the mass worked with a paddle, to separate the slag, which is raked off, and the richer portion of it melted over again. The reduced tin subsides to the bottom, and is run off into a cast-iron pan, from which it is ladled into molds, to produce block or ingots of convenient size.

The tin has still to be purified, first by a process of *liquation*, and afterward by that of *boiling*. 'Liquation' consists in moderately heating the blocks in a reverberatory furnace till the tin, owing to its comparatively easy fusibility, melts, and flows into the refining-basin, leaving on the hearth of the furnace a residuary alloy of tin with iron and other metals. More blocks are added, and heated in the same way, till the refining-basin contains about five tons. The tin is then ready for 'boiling.' In this operation, billets of green wood are plunged into the melted metal, the disengagement of gas from which produces a constant ebullition, and so causes a scum (chiefly oxide of tin) to rise to the surface, which is then easily removed; at the same time, impure and dense parts fall to the bottom: when the agitation has gone on long enough, the bath is allowed to settle and cool. The tin then separates into zones—the upper consisting of the purest portion; the middle being slightly mixed with other metals; and the lower so much so, that it requires to go through the refining process again. The residuary alloy of the liquation process has also its tin extracted and refined again.

Tin ores which contain the mineral wolfram (tungstate of iron and manganese) are treated by Oxland's process. This mineral and tin ore are so nearly the same in specific gravity, that no mechanical process of washing will separate them. Oxland's process consists in roasting the dressed tin ore with sodium sulphate to convert the insoluble tungstate of iron and manganese into the soluble tungstate of sodium, which is easily removed by lixiviation. The oxides of iron and manganese, which are left in finely-divided state, can then, from their lower density, be readily removed by washing. The tungstate of sodium procured in the operation has been found one of the most valuable substances for rendering cotton cloths non-inflammable.

Tin when heated to nearly its melting-point becomes brittle, and can then be broken into prismatic fragments called *dropped* or *grain tin*. The metal which is susceptible of this change may be considered of fine quality, as impure tin does not become brittle when so treated. The peculiar properties of tin, especially its malleability, its brilliancy, and the slowness with which it oxidizes at common temperatures in the atmosphere, render it of great

service in the arts. Utensils coated with silver require six cleanings for one that would suffice with 'tinned' vessels. Tin is consequently largely used to coat the surface of other metals, as iron and copper, especially thin sheet-iron to form tin-plate.

With other metals tin forms some valuable alloys: see ALLOY. An amalgam of tin and mercury forms the metallic coating of mirrors. Tin-foil, $\frac{1}{1000}$ of an inch thick, is used for various purposes, and contains 96 to 98·5 per cent. of tin, with small proportions of copper, lead, iron, and sometimes nickel. The import of T. into the United States (1902-03), in tin bars, blocks, pigs, grain, and granulated, was 1,164,859 lbs., value $321,652.

TIN-PLATE.—This manufacture forms a branch of the iron trade. The art of tinning plate-iron is said to have been invented in Bohemia, about the beginning of the 16th c., though the tinning of copper was practiced earlier; tin-plate was made in England, first about 1670.

Sheet-iron for tin-plates is made either of charcoal-bar or coke-bar, which has been rolled with particular care, to avoid scales on the surface. Before tinning, the plates are called 'black plates.' When the iron has been cut to the required size, the plates are 'pickled'—i.e., immersed in hot sulphuric or hydrochloric acid diluted with 16 parts of water to 1 of acid, the use of the acid being to remove all oxide. After this, the plates require washing several times in water; then follows an annealing in closed cast-iron boxes in a reverberatory furnace. The next operation consists in passing the plates two or three times between chilled iron rollers highly polished with emery and oil, to give the plates a polished surface. Once more they are sent to the annealing furnace; passed again through dilute sulphuric acid; then again washed, but this time in running water; and then scoured with sand. This should leave them clean and bright for the tinman.

Each plate is now put singly into a pot of melted grease (which has become sticky by use), and left till it is completely coated, after which the plates are taken in parcels and plunged into a bath of melted tin covered with grease, called the 'tin-pot.' They pass from this to another vessel, with two compartments, called the 'wash-pot,' both of which contain melted tin of the purest quality, and, like the last, covered with grease. The plates are put into the first compartment in parcels, where they receive a coating of purer tin than that of the 'tin-pot,' and are then withdrawn one by one, and wiped on both sides with a hemp brush; the marks of which are obliterated by another dipping in the second compartment of the 'wash-pot.' This last dipping also gives the plates a polish. Next is the removal of the superfluous tin by immersing the plates in a pot containing tallow and palm-oil, maintained at a temperature no higher than will keep in liquid state the tin in contact with the oil, and so allow it to run off. The final treatment consists in working the plates separately in troughs of bran with a little meal, and then rubbing them with flannel.

There is a varicty of tin-plates called 'terne-plates,' coated with alloy of tin and lead, in which the proportions vary from one of lead and two of tin to two of lead and one of tin. They are used for roofing.

The manufacture of household and culinary articles of tin has been carried on in the United States since about 1850. The first plants for the combined manufacture of tin and terne plates were established in 1873, but until 1890 this industry was carried on under great difficulties: and its great growth has taken place since 1890. The production increased from 2,236,000 lbs. in 1891 to over 849,000,000 lbs. in 1900, the establishments engaged in the latter year, numbering 57.

TINCAL, n., or TINKAL, n. *tĭng'kăl* [Mal. *tingkal:* Pers. *tinkar*]: crude Borax (q.v.).

TINCHEL, n. *tĭn'chĕl* [Gael. *timchioll*, a circuit, a compass]: in *Scot.*, a large number of sportsmen who, having surrounded an extensive space, gradually close in upon their game; also TIN'CHILL, *-chĭl.*

TINCT, v. *tĭngkt* [L. *tinctus*, pp. of *tingĕrĕ*, to color]: in *OE.*, to color; same as TAINT (q.v.): ADJ. in *OE.*, colored; stained: N. in *OE.*, color; stain.

TINCTURE, n. *tĭngk'tūr* [L. *tinctūra*, a dycing; *tinctus*, pp. of *tingĕrĕ*, to dye: It. *tintura;* F. *teinture*, dye, tincture]: the color with which anything is impregnated; a tinge of color; tint; hue; in *her.*, one of the colors used in achievements (see HERALDRY); a slight taste or quality added to anything: a liquid extract; in *med.*, a solution, generally in spirit, of the active principles of any substance (see below): V. to impregnate with any foreign matter; to communicate a portion of anything foreign; to imbue the mind. TINC'TURING, imp. TINC'TURED, pp. *-tūrd.* TINCTORIAL, a. *tĭngk-tō'rĭ-ăl*, containing or imparting color.

TINCTURE: commonly, alcoholic solution of vegetable, animal, or some saline substances; sometimes ammonia is added to the alcohol—when the solution is known as *ammoniated tincture;* solutions in water and in ether are also prepared, known as *aqueous tinctures* and *ethereal tinctures.* The alcohol employed in preparing tinctures is either the rectified spirit (*U. S. Pharmacopœia*), having specific gravity 0.835, or proof-spirit, specific gravity 0.941. Tinctures made with 0.835 spirit (pure alcohol) are precipitated by water, and therefore are seldom used internally; those prepared with proof spirit are commonly employed as infusions, decoctions, etc. Full directions for making tinctures are found in the *U. S. Pharmacopœia* in all its editions.

TIND, v. *tĭnd* [AS. *tendan;* Dan. *tænde:* Sw. *tända*, to kindle (see also TINDER)]: in *prov. Eng.* and *OE.*, to light or kindle.

TIN'DAL, MATTHEW: English deistical writer: 1656-1733, Aug. 16; son of a clergyman at Beer-ferris, in Devonshire. He was educated at Lincoln and Exeter colleges, Oxford; took the degree B.A. 1676; and soon afterward was elected fellow of All Souls' college. In 1685 he became a doctor of law; and after a brief lapse into Romanism, during the reign of James II., reverted to Protestantism, or rather, as events showed, into rationalism. His first work was *An Essay concerning Obedience to the Supreme Powers,* etc. (Lond. 1693), followed by *An Essay concerning the Laws of Nations and the Rights of Sovereigns;* but it was not till 1706 that he attracted much notice, when the publication of his treatise on *The Rights of the Christian Church asserted against the Romish and all other Priests who claim an independent power over it; with a Preface concerning the Government of the Church of England, as by Law established,* raised a storm of opposition. A torrent of replies and refutations poured from the press. Among those who signalized themselves as adversaries of Tindal, the least obscure were Dr. G. Hickes and Conyers Place; Swift also indulged in some 'Remarks.' On the continent, Tindal's work was favorably received. Le Clerc, in *Bibliothèque Choisie,* praises it highly, as one of the solidest defenses of Protestantism ever written. In 1730, when Tindal had nearly reached the age of 73, he published his most notable and popular treatise, *Christianity as Old as the Creation, or the Gospel a Republication of the Religion of Nature.* The design of the work, which is written in excellent English, is to strip religion of the additions which policy, mistake, and the circumstances of the time have made to it'—in other words, to eliminate the supernatural element of Christianity, and to prove that its morality, which is admitted to be worthy of an 'infinitely wise and good God,' is its true and only claim to the reverence of mankind. His argument is based on a pure assumption—that the true religion, being from God, must therefore necessarily be eternal, universal, simple, and perfect, and can consist of nothing but the practice of morality. In Christianity as the true religion, reason must be supreme above all positive revelation whether of doctrine or precept. The argument takes no note whatever of the historical facts in man's religious development. Tindal's purpose was rather constructive than destructive; and he called himself a 'Christian Deist.' He was answered by Dr. Waterland, Foster (eminent dissenting minister), Dr. Conybeare (afterward bp. of Bristol), and Dr. Leland (q.v.), with various degrees of ability and success.

TINDALE or TINDALL, WILLIAM. See TYNDALE, WILLIAM.

TINDER, n. *tĭn'dėr* [Sw. *tindra,* to sparkle; *tunder,* tinder: Icel. *tendra,* to light a fire; *tundr,* tinder: Ger. *zunder,* tinder; *anzünden,* to kindle: comp. Gael, *teine,* a

fire]: any very inflammable material, usually partially burnt linen, used for obtaining fire by striking a spark among it by means of a flint and steel, formerly one of the chief means of procuring fire before the introduction of Matches (q.v.) Partially decayed wood, especially that of willows and other similar trees, also affords tinder: and certain fungi furnish the German tinder, or amadou (see AMADOU; PUNK; SPUNK). TIN'DERY, a. *-ĭ*, or TINDER-LIKE, a. like tinder; inflammable. TINDER-ORE, an impure arsenical sulphide of antimony and lead, occurring in soft flexible flakes resembling tinder, of a dirty-reddish color. TINDER-BOXES, boxes in which tinder was kept ready for use; they were usually provided with a flint and steel, the latter often fastened to the cover of the box in such a manner that the flint when struck against it sent sparks into the tinder within.

TINE, n. *tīn* [Icel. *tindr;* Sw. *tinne,* the tooth of a rake or harrow: Gr. *zinne;* Dan. *tinde,* a pinnacle: Dan. *tand,* a tooth: allied to TOOTH]: the point of a fork of a deer's horn; one of the spikes of a fork or of a harrow; a prong. TINED, a. *tīnd,* furnished with tines.

TINE, v. *tīn* [see TIND]: in *OE.,* to kindle; to burn; to rage; to smart. TI'NING, imp. TINED, pp. *tīnd.*

TINE, n. *tīn* [see TEEN 1]: in *OE.,* trouble; distress.

TINE, v. *tīn* [Icel. *tyna,* to lose]: in *Scot.,* to lose or be lost; also spelled TYNE.

TINEA, n. *tĭn'ē-ă* [L. *tinĕa,* a gnawing worm]: a parasitic disease of the skin, and especially of the scalp. For three of the most important varieties of tinea, viz., *tinea circinatus* (ringworm of the body). *Tinea tonsurans* (ringworm of the scalp), and *tinea sycosis* (ringworm of the beard), see RINGWORM. In these three varieties, included in the general term *tinea tondens,* the vegetable parasite known as *Trichophyton tonsurans* is always present.—It remains to notice the *tinea decalvans* of Bateman, known also as *Porrigo decalvans, Alopecia circumscripta,* etc. It is defined by Aitken as 'a fungus disease, causing the formation of rounded or oval patches of baldness, sometimes solitary, more generally multiple. It affects the hairy scalp principally; but the beard and hairy portion of the skin may also suffer. The fungus which causes these patches of baldness was detected by Gruby 1843, and named the *Microsporon Audouini:* it differs from the *Trichophyton* by its numerous waved filaments and the extremely small size of its sporules, likewise by its position, not being found in the interior of the root of the hair, but forming a little tube round each hair, and thus causing it to soften and break down. The hair thus affected becomes dull and partially loose; the skin in which they are implanted becomes red, swollen, and slightly itchy; and a whitish matter (sporules of the fungus) may soon be observed on the diseased skin and hairs. The hairs then fall off from the affected part, leaving a

round bald patch of very white color. The disease is capable of transmission from one person to another, though less readily than *Tinea tonsurans.* It affects children chiefly. The treatment consists in preventing the spread of the disease by extracting the hairs round the circumference of the patch and washing the head daily with soft soap; and all the young hairs within the patch must be extracted till a healthy crop begins to appear. Moreover, a solution of sulphurous acid, as recommended for ringworms, should be applied. When by these means the fungus has been destroyed, stimulants must be applied to the bald patches.

TINEIDÆ, *tĭ-nē'ĭ-dē:* family of small moths, smallest insects of the lepidopterous order. The body is long and slender, wings entire, often narrow, mostly convoluted in repose. Many of them are very brilliantly colored, exhibiting beautiful little stripes and patches of gold and silver. Many deposit their eggs in animal substances, on which the larvæ feed, making cases for themselves out of the substance that they feed on. The Clothes-moths are a familiar example.

TINFOIL. See under TIN.

TING, n. *tĭng* [imitative of the sound]: the sharper sound of a bell—the deeper tone is called TONG, and the combination is TING-TONG, usually spelled DING-DONG (q.v.).

TING: for THING, which see.

TINGE, v. *tĭnj* [L. *tingo,* I moisten, I dye: F. *teindre,* to dye or color]: to color or stain; to impregnate slightly with something foreign; to dye; to communicate in a slight degree the taste or qualities of a substance: N. a slight degree of color or taste derived from some other substance. TING'ING, imp. TINGED, pp. *tĭnjd.*

TINGI, *tĭng'gĭ* (*Magonia glabrata*): tree of nat. order *Sapindaceæ,* which covers large tracts of country in parts of Brazil, excluding almost everything else, growing usually to the height of 30 or 40 ft., sometimes much higher. An infusion of the bark of the roots is used to poison fish. The fruit is a large dry triangular capsule, filled with broad flat seeds, from which a kind of soap is made. The membrane which covers the cotyledons is stripped off, and they are steeped in water till they begin to swell and soften, and boiled with a little tallow. A homogeneous mass is formed, which is used for washing clothes.

TINGLE, v. *tĭng'gl* [imitative of the sound of a small bell, represented in different languages by the syllables *tin, ting, tink, tang, twang:* L. *tinnīrĕ,* to ring: F. *tinter,* to ring, to tingle; *tinton,* the ting of a bell: Dut. *tintelen,* to tingle as with cold]: to feel a prickling or stinging sensation, generally disagreeable and painful, but some-

times imparting a degree of pleasure; to tinkle. TIN'-GLING, imp. *-gling:* N. a thrilling sensation; a noise in the ears. TINGLED, pp. *ting-gld.*

TINKAL, n. *ting'kăl:* see TINCAL.

TINKAR'S ROOT, *ting'kârz rôt* (*Triosteum perfoliatum*): shrubby plant of nat. order *Caprifoliaceæ,* native of N. America. Its root is used as an emetic and mild cathartic. It is named from a physician who brought it into notice.

TINKER, n. *ting'kėr* [imitative of the *tinking* or clinking sound of working or hammering metal: probably Scot. *tink,* to rivet, the noise so made: W. *tincerdd,* a tinker; *tincian,* to tinkle]: a mender of pots and pans, especially such as are made of tin-plate; any mender or botcher]: V. to work as a tinker; to patch up coarsely; to cobble; to botch. TIN'KERING, imp.: N. the employment of a tinker; the act of patching up coarsely. TIN'-KERED, pp. *-kėrd.*

TINKLE, v. *ting'kl* [imitative of the sound of small bells (see TINGLE)]: to make or give out a succession of small, quick, sharp sounds, as of little bells or pieces of metal; to cause to clink; to tingle: N. a clink; a sharp quick noise. TIN'KLING, imp.: ADJ. making a sharp quick noise: N. a small, quick, sharp sound, as of a small bell. TINKLED, pp. *ting'kld.*

TINNE, *tin-nā':* name given to a group of aboriginal tribes in the region between Hudson bay and the centre of Alaska. They are of the Athabascan family; are of tall stature and have some beard; their complexion is dark and their faces full. Their weapons are exceedingly primitive, made of stone and of bone. The Tinnés are hunters and fishers.

TINNITUS AURIUM, *tin-nī'tŭs aw'ri-ŭm* [Latin]: ringing in the ears. In most cases, when temporary, it is an unimportant symptom, depending on some local affection of the ear, or on some disturbance of the digestive system; but as it is also a common symptom of organic disease of the auditory nerve, it may indicate a dangerous condition, or may be a prelude to complete deafness. It is often exceedingly persistent and troublesome in deafness from chronic disease of the middle ear. In such cases considerable amelioration may be obtained by means of so-called auditory massage effected by holding an electrically driven 'buzzer' close to the ear for a few minutes once or twice a day. It may be induced for a few hours by a large dose of quinine.

TINOCERAS, *tī-nŏs'ė-ras:* a genus of mammals now extinct, found in the Eocene of Wyoming (Bridger beds) and representing the order *Dinocerata* (q.v.). The individuals were all large, some of them nearly equaling the elephants, and differed little from *Uintatherium.*

TINOS, *tē'nos*, or TINO, *tē'nō* (anc. *Tenos*): island in the Grecian archipelago, belonging to the group of the Cyclades; s.e. of the island of Andros, 53 m. off the coast of Bœotia; 18 m. long, 8 m. in extreme breadth; 70 sq. m. The Tenians were conspicuous among anc. Greeks for their industry, and still maintain that pre-eminence. The island is carefully cultivated, well-watered, has a delightful climate, and is very productive in silk, wine, barley, and fruits. Silk gloves and stockings are manufactured; and the inhabitants are famous workers in marble, which is found in the island. In the modern town of Tenos, or St. Nicholas, is a cathedral of white marble, a favorite resort for pilgrims.—Pop. about 13,000.

TINSEL, n. *tĭn'sĕl* [OF. *estincelle;* F. *étincelle*, a sparkling, a spangle—from L. *scintilla*, a spark]: a loose tissue interwoven with shining thread of silver or gold—used largely for theatrical purposes, and in embroidery, etc.; something very shining and gaudy; something showy, or having a false lustre, but without value: ADJ. gaudy; showy to excess; superficial: V. to adorn with something glittering, but not of much value; to make gaudy. TIN'SELLING, imp. TIN'SELLED, pp. *-sĕld.*

TINSEL. n. *tĭn'sĕl* [Scot. *tine, tyne*, to lose (see TINE 4)]: in *Scot.*, loss. TINSEL OF THE FEU, in *Scots law*, forfeiture of a feu-right owing to non-payment of feu-duty for two whole years: see FEU.

TINT, n. *tĭnt* [L. *tinctus*, pp. of *tingĕrĕ*, to color, to tinge: It. *tinta;* F. *teint*, dye, hue]: a slight coloring distinct from the ground or principal color; a shade; a hue of color; the different degrees of intensity and strength of color in a pigment: V. to give a slight coloring to. TINT'ING, imp.: N. a forming or imparting of tints. TINT'ED, pp.: ADJ. slightly stained or dyed; tinged. TINT'LESS, a. *-lĕs*, having no color.

TINTERN AB'BEY, *tĭn'tėrn:* famous ecclesiastical ruin on the right bank of the Wye, in Monmouthshire, England; about 9 m. s.s.e. of Monmouth. The Abbey—properly so called—was founded 1131 for Cistercian monks, by Walter de Clare, and dedicated to St. Mary; but in the previous century a church had been built: mass was celebrated by abbot and monks first in 1268. The style of architecture is a transition from Early English to Decorated, and is very fine. Most of the building, except the roof and tower, remains. T. A. owes not a little of its celebrity to Wordsworth's poem, *Lines composed a few Miles above Tintern Abbey, on revisiting the Banks of the Wye*—though the Abbey is not mentioned or alluded to in the poem.

TINTINNABULAR, a. *tĭn'tĭn-năb'ū-lėr*, or TIN'TINNAB'ULARY, a. *-lėr-ĭ* [L. *tintinnab'ŭlum*, a bell—from *tintinnārĕ*, to ring, to jingle: an imitative word]: relating to or connected with a bell; making the sound of a bell. TIN'TINNAB'ULANT, a. *-ū-lănt*, same as TINTINNABULAR. TIN'TINNAB'ULA'TION, n. *-lā'shŭn*, a tinkling sound as of a bell.

TINTORETTO, *tĭn-to-rĕt'to* (real name, JACOPO ROBUSTI, *yâ'ko-po-to-bôs'tē*): Venetian historical painter, called T. (Little Dyer) from his father's occupation as dyer (*Tintore*): 1518, Sep. 16—1594, May 31 (according to dates in the register of deaths in S. Marciliano); b. Venice. He studied for a few days under Titian, but appears to have been mostly self-taught. His assiduity, when young, in acquiring a varied knowledge of the human figure under all possible aspects of light and shade, commands respect, in spite of the theatrical means to which he often resorted: and the rapidity of his pencil (which got him the name *Il Furioso*) is astonishing. Sebastian del Piombo remarked that T. could paint as much in two days as he could do in two years. A catalogue of T.'s works, specimens of which are in almost all galleries, is impossible within our limits: the following are a few of the more famous: *Belshazzar's Feast, and the Writing upon the Wall* (fresco, for the Arsenal at Venice), *The Tiburtine Sibyl, The Last Supper, and the Washing of the Disciples' Feet, A Crucifixion, The Worship of the Golden Calf, The Last Judgment* (the last two immense pictures 50 ft. high and splendid in conception), *St. Agnes restoring to Life the Son of a Prefect, The Miracle of St. Mark,* a *Resurrection of Christ, The Slaughter of the Innocents,* and a grand picture of *Paradise*—34 ft. high by 74 long, with more than 100 figures, reputed the largest picture ever painted on canvas. Some of T.'s earlier pictures are carefully finished; but his later ones are dashed off with a fatal haste, that justifies the remark of Annibal Caracci that, if he 'was sometimes equal to Titian, he was often inferior to Tintoretto.' T. lavishly indulged in *chiaro-oscuro,* but his coloring is not gay or brilliant; it is rather cold and leaden, as might be expected of a painter who, when asked what were the prettiest colors, replied; 'Black and white.' He was never precise, often incorrect as judged by the standards; but was among the most original, audacious, and imaginative of painters.

TINY, a. *tī'nĭ* [imitative of making the voice pipy to express something very small: Gael. *tana,* thin, slender: Dan. *tynd,* thin]: very small; little; puny. TI'NIER, compar. *-ẽr.* TI'NIEST, superl. *-ĕst.*

TIP, n. *tĭp* [Dut. *tip,* a point: Ger. *zipfel,* a tip, a corner. Icel. *toppr;* Dan. *top,* top, summit]: the point or extremity of anything small, as of the finger or tongue; the end; a light quick movement; a slight blow; in *slang,* a hint; a small present in money: V. to form a point to; to cover on the top or end, as to *tip* with gold; to strike lightly; in *slang,* to give a hint or wink; to make a present in money. TIP'PING, imp.: N. in *music,* a distinct articulation given to the flute by striking the tongue against the roof of the mouth. TIPPED, or TIPT, pp. *tĭpt,* having the top or end covered. TIP-CAT, n. game in which a small piece of wood tapering to a point at each end, and called a cat, is made to rebound from the ground by being struck on the tip with a stick. TIPSTAFF, n. a staff tipped with metal: an officer who bears a staff tipped with metal; a constable—plu. TIPSTAVES TIP'STER, n. *-stẽr,* in *sporting slang,* one who supplies tips

or information regarding races; a sporting prophet. TIP-TOE, n. the point of the toe. ON THE TIPTOE OF EXPECTATION, eagerly alive in regard to the coming or happening of something. ON THE TIP OF THE TONGUE, on the point of being uttered. TIPTOP, a. highest; supreme; superb: N. the highest or utmost degree; the extreme. TO TIP THE WINK, in *slang*, to intimate to another by means of a wink. TO TIP OVER, or TO TIP UP, to overturn lightly. TO TIP OFF, to drink all up at one gulp.

TIPPECANOE, *tĭp-ē-ka-nō'*, RIVER: stream in Indiana, rising in T. Lake in the n. part of the state, flowing s.w. 200 m., and emptying into the Wabash 9 m. above Lafayette. It is famous for the battle on its banks.—The BATTLE OF TIPPECANOE, 1811, Nov. 5, was fought by Gen. William H. Harrison against the Indians under Tecumseh's brother, the prophet. Tecumseh himself was absent from the tribe, attempting to form an alliance with tribes further s. for hostilities against the whites. Gen. Harrison distrusted the 'prophet,' and thought it better to build a milit. post near T., the 'prophet's' village, than to carry out the plan of the govt. and forcibly seize the Indian leader. He built a fort near the site of Terre Haute in Oct., and, leaving a garrison there, marched toward T. When within 1½ m. of the Indian village, he was met by messengers from the 'prophet' demanding a parley, and a council was proposed for the next day. While the army of 300 regulars and 500 militiamen were sound asleep, the Indians suddenly attacked the camp at 4 o'clock in the morning. A desperate fight ensued, lasting till daylight; and the Indians were finally defeated, and were dispersed by the cavalry. The U. S. forces lost 108 in killed and wounded, and the Indians left 40 of their number dead on the field. The Indians immediately evacuated their village, and on the following day the troops burned it. In 1839, when Gen. Harrison and John Tyler were candidates for pres. and vice-pres., the battle of T. was recalled in a popular campaign-cry, 'Old Tippecanoe and Tyler too!'

TIPPERARY, *tĭp-ĕr-ā'rĭ:* inland county of the province of Munster, Ireland; bounded s. by Waterford, w. by Cork, Limerick, Clare, and Galway; 1,659 sq. m., or 1,061,731 acres, of which 843,837 are arable, 178,183 uncultivated. Pop. (1871) 216,713, of whom 203,227 were Catholics, 13,459 Protestants; (1881) 199,004, mostly Rom. Catholics. The inhabitants are chiefly engaged in agriculture. Pop. (1891) 172,882; (1901) 160,232.

The county of T. is mostly in the basin of the river Suir. There are many little lakes. The county is intersected by two railways. The surface is generally somewhat level: among the hills are the Galtees (3,000 ft. high), Knockmeledown (2,700 ft.), and Keeper Mountain (2,100 ft). There is a singular height called the Devil's Bit, to which many popular legends attach. The soil of the plain is a rich calcareous loam, singularly fertile, especially a district called the Golden Vein, in the centre of which is the town of Tipperary (q.v.). In geological formation the plain belongs to the great central limestone district. The hills are

mostly of clay-slate, surrounded or surmounted by sand stone. There is much bog in the central and e. districts, one continuous tract extending 30 m. The mineral productions are coal (anthracite), copper, lead, zinc, and fire-clay; also excellent slates. Dairy-farming and raising of cattle have largely taken the place of the production of cereals. Flax is sparingly produced.

Anciently T. formed part of the two distinct principalities of Ormond, or North Munster, and Desmond, or South Munster: after the English invasion, T. was formed into a county by King John 1210; but the authority of the conquerors was long little more than nominal. Eventually it was divided between the Anglo-Norman families of Butler, which held Ormond, and Geraldine, to whom a portion of Desmond fell. The Anglo-Norman and Celtic antiquities are numerous: the city of Cashel, presenting, in the ruin of Holy Cross, a noble specimen of the monastic remains of the mediæval period, and the castle of Cahir exhibiting the military and baronial architecture of the same age. There is a series of curious caves near the border of the county of Cork.

TIPPERA'RY: market-town of the county of T., Ireland; on the river Arra, 110 m. s.w. from Dublin by railway. T. has an extensive trade in butter. The town is very ancient, and soon after the invasion was occupied as a strong place by the English, who built a castle in it during the Irish expedition of King John. The town is well built and contains a large and handsome Rom. Cath. church and several Prot. churches.—Pop. (1891) 6,391.

TIPPET, n. *tĭp'pĕt* [AS. *tæppet*, a tippet—from L. *tapētē*, cloth—from Gr. *tapēs*, a carpet]: a narrow garment or covering of fur or cloth for the neck and shoulder.

TIPPLE, v. *tĭp'pl* [Bav. *zipfel*, a corner of anything, a small portion: prov. Eng. *tip*, a draught of liquor: Low Ger. *tippl*, a dot, a fine drop: Norw. *tipla*, to drip slowly, to sip]: to drink intoxicating liquors frequently in small quantities or to excess: N. an excess in drinking intoxicating liquors: the liquor taken in tippling. TIP'PLING, imp. *-plĭng:* ADJ. indulging in the habitual use of intoxicating liquors. N. the habitual use of strong liquors; a drinking to excess. TIPPLED, pp. *tĭp'pld:* ADJ. intoxicated. TIP'PLER, n. *-plĕr*, one who tipples. TIPPLING-HOUSE, a shop where intoxicating liquors are retailed to be drunk on the premises; a dram-shop.

TIPPOO SAHIB, *tĭp-pō' sâ'hĭb*, Sultan of Mysore: 1749–1799, May 4; son of Hyder Ali (q.v.). Efforts were made to instruct him in Mohammedan learning; but T. preferred athletic exercises and the companionship of the French officers in his father's service, from whom he learned European military tactics. This knowledge he afterward put to effective use during his father's wars with the British. On the death of his father, he was crowned with little ceremony, returning at once to the head of his army, which was then engaged with the British near Arcot. In 1783 he captured and put to death most of the

garrison of Bednore; but when his French allies had news of the peace between France and England, they retired from his service; and T. agreed to a treaty 1784, stipulating for the *status quo* before the war. His inveterate hatred of the English led him to invade the protected state of Travancore; and in the war (1790–1792) the British, under Colonel Stuart and Lord Cornwallis, were aided by the Mahrattas and the Nizam, who detested their powerful neighbor (T. being a fanatical Mohammedan); and though he laid waste the Carnatic almost to the gates of Madras, he was ultimately compelled (1792, Mar. 16) to resign one-half of his dominions, pay an indemnity, and give his two sons as hostages for his fidelity. Nevertheless, his secret intrigues in India against the British were almost immediately resumed; another embassy was sent to the French; and the invasion of Egypt by the latter in 1798, and T.'s machinations, having almost simultaneously become known to the gov.gen., hostilities were begun 1799, Mar.; and two months afterward T. was driven from the open field, attacked in his capital of Seringapatam, and, after a gallant resistance, slain. His government of Mysore after 1792 was oppressive; yet T. was extremely popular, and after his death was esteemed by the Mohammedans as a martyr to the faith of Islam.

TIPSTAFF, n. *tĭp'stâf:* see under Tip.

TIPSY, a. *tĭp'sĭ* [Swab. *tapps;* Swiss, *tips*, a fuddling with drink: Swiss, *tipseln*, to fuddle one's self: connected with Tipple]: affected with liquor; slightly intoxicated. Tip'sily, ad. *-lĭ.* Tip'siness, n. *-nĕs*, the state of being tipsy.

TIPTOE, TIPTOP: see under Tip.

TIPULARY, a. *tĭp'ū-lĕr-ĭ* [L. *tip'ŭla*, an insect that runs swiftly over the water]: of or pertaining to insects of the genus *Tipŭla*, or the crane-fly kind.

TIP'ULA and TIPU'LIDÆ: see Crane-fly.

TIRABOSCHI, *tē-râ-bos'kē*, Girolamo: Italian author: 1731, Dec. 18—1794, June 3; b. Bergamo. He studied at Monza, and entered the order of the Jesuits. Toward 1766 he was appointed prof. of rhetoric at Milan, where he wrote his first work, *Vetera Humiliatorum Monumenta* (1766); and 1770 succeeded Granelli as librarian to the Duke of Modena. T. now availed himself of the rich stores of the ducal library, besides making extensive researches in other archives, to compose *Storia della Letteratura Italiana* (History of Italian Literature) (13 vols. 1771–82; best ed., Milan, 16 vols. 1822–26). It embraces the history of ancient and modern Italy, and is especially valuable for the light which it throws on the intellectual condition of the peninsula during the dark ages, and the brilliant period from Dante to Tasso. T. ends his elaborate survey with the 17th c. It is impossible to praise too highly the learning and the conscientious accuracy of the author, even though minute and special investigations of many of the epochs have since necessitated revision of parts of the work. Abridged translations have appeared in

French and German. A continuation embracing the literature of the 18th c. was written by Lombardi (*Storia della Letteratura Italiana nel Secolo XVIII.*). T. died at Modena. Other works by him are *Biblioteca Modenese* (6 vols. Mod. 1781–86); *Memorie Storiche Modenesi* (3 vols. Mod. 1793).

TIRADE, n. *tĭ-rād'* [F. *tirade*, a long train of words—from F. *tirer*, to draw]: a long train of words; a long-drawn passage or sequence of expression on a single theme; a long-drawn declamatory outpour of words, especially in censure or reproof.

TIRAILLEUR, n. *tĭr'ī-yėr'* [F.]: one of a body of sharp shooters thrown out from the main body of an army, put in front to annoy the enemy; a skirmisher.

TIRE, n. *tīr* [an abbreviation of ATTIRE, which see]: in *OE.*, a head-dress; attire; furniture; apparatus: V. in *OE.*, to dress the head by doing up the hair; adorn; attire. TIRE-WOMAN, a female head-dresser; a milliner; a dresser in a theatre. TIRING-ROOM, the dressing-room of a theatre. TIRING-HOUSE, in OE., a tiring-room.

TIRE, n. *tīr* [from *tie*, to fasten or bind]: a heavy band or hoop of iron placed around a wheel to form the tread and to tie or bind the fellies of wheels together.

TIRE, v. *tīr* [AS. *teran*, to break, to tear: Low Ger. *teren*, to pull, to plague: Sw. *tæra*, to rub, to wear away: AS. *tirian*, to vex, to irritate: O. Dut. *tergen;* Dan. *tærge;* Ger. *zergen*, to irritate: Dan. *tirre*, to tease, to worry—*lit.*, to provoke, irritate, or harass]: to wear out and fatigue; to weary; to exhaust the strength by labor; to be fatigued; to fail with weariness; to have the patience exhausted. TIRING, imp. *tīr'ĭng.* TIRED, pp. *tīrd:* ADJ. weary; fatigued; jaded. TIREDNESS, n. *tīrd'nĕs*, the state of being wearied. TO TIRE OUT, to weary or fatigue beyond further exertion; to exhaust the patience of. TIRESOME, a. *tīr'-sŭm*, fatiguing; wearisome; tedious; exhausting patience. TIRE'SOMELY, ad. *-lĭ.* TIRE'SOMENESS, n. *-nĕs*, the quality or state of being tiresome; tediousness.—SYN. of 'tire': to weary; fatigue; exhaust; harass; jade.

TIRE, v. *tīr* [Icel. *tæra;* Low Ger. *teren;* Ger. *zehren*, to consume (see TEAR 2)]: in *OE.*, to draw; pull; seize; tear; pull apart and prey upon, as birds of prey. TIR'ING, imp. TIRED, pp. *tīrd.*

TIRE, or TIER, n. *tēr* [OF. *tiere*, rank, order: Low Ger. *tier*, a row of connected things (see TIER)]: in *OE.*, a row or rank; in *mil.*, guns, shot, and shells, etc., placed in a regular form.

TIREE, *tĭ-rē':* an island of the Inner Hebrides, included in Argyleshire, Scotland; 20 m. n.w. of Iona; 13 m. long, and about 6 m. in extreme breadth. The surface is low, rising in the n. little above 20 ft., and in the s. to about 400 ft. above sea-level. It is without trees and shrubs, and has numerous small lakes. Remains of Scandinavian forts dot the shores, and standing-stones, ruined churches, and ancient graves are found in the interior.—**Pop. about 3,000.**

TIRESIAS, *tī-rē′shĭ-as,* in Greek Mythology: famous prophet, who, according to one legend, was struck blind by the goddess Athena because he had seen her bathing. Another legend represents Hera as depriving him of his sight because, being made arbiter in the dispute between her and Zeus, he had decided in favor of Zeus; when Zeus as a compensation granted him the inner vision of prophecy, and prolonged his life for several generations; but Tiresias at last found death by drinking from the well of Tilphossa. There are many variations of his legend in the myths of Greece. According to Homer, Tiresias was the only human being in the regions of the dead whom Proserpine allowed to retain intelligence. Tiresias is the theme of a fine poem by Lord Tennyson (1885).

TIRL, v. *tėrl* [a form of THIRL 1]: in *Scot.,* to vibrate; move tremulously; twirl; shake. TIR′LING, imp. TIRLED, pp. *tėrld.* TO TIRL AT THE PIN, to shake or rattle the thumb-piece of a latch before opening the door.

TIRLEMONT, *tĭrl-mōng′* (Flemish, *Thienen*): town of Belgium, in S. Brabant, on the Great Geete, about 30 m. e.s.e. of Brussels, on the Brussels and Cologne railway. The church of St. Germain, on an eminence, dates apparently from the 9th c., and contains an altar-piece by Wappers. Beer and hosiery are manufactured. Tirlemont was ravaged by Marlborough 1705; and here the French under Dumouriez defeated the Austrians 1793.—Pop (1901) 19,000.

TIRO, n. *tī-rō:* same as TYRO (q.v.).

TIROLITE, n., or TYROLITE, n. *tĭr′ō-līt* [so called from being found in many parts of the *Tyrol;* Gr. *lithos,* a stone]: copper-froth; a fine verdigris-green or azure-blue carbonate of copper and arsenic.

T-IRON, n. *tē-ī′ėrn:* rolled bar-iron, shaped, when cut in sections, like the letter T.

TIRRIT, n. *tĭr′rĭt* [comp. Gael. *tuireadh,* a lament, a dirge]: in *OE.,* a lamentation; a complaint; a wail.

TIRYNS, *tī′rĭnz:* small city of Argolis, in the Peloponnesus, in the prehistoric period of Greece, long before the Dorian immigration; about 3 m. from the sea, s.e. of Argos, near the head of the Argolic Gulf. According to the common tradition, it was founded by Prœtus, a mythic king of Argolis; and its massive walls, like other rude massive structures in Greece of unknown antiquity, were reputed the work of the Cyclopes. Prœtus is said to have been succeeded by Perseus; and in this place Hercules was believed to have passed his youth. At the time of the Trojan war, Tiryns appears to have been subject to the kings of Argos. Its greatest prosperity was in B.C. 11th and 10th c. Some time (probably about B.C. 468) after the battle of Platæa (to which the Tirynthians sent troops), the city was taken by the Argives,

and destroyed—the walls of the citadel only being left standing, the wonder and admiration of later ages.—Tiryns affords one of the most interesting specimens of Cyclopean architecture, the ruins of this place, and those of the neighboring city of Mycenæ, being the grandest in Greece. The ruins of Tiryns illustrate the Homeric palaces of a thousand years before Christ. The Acropolis, or citadel of Tiryns was on the summit of a low, flat, rocky hill, rising abruptly out of the dead level of the plain of Argos, and appears to have consisted of an upper and a lower inclosure of nearly equal size, with an intermediate platform. There were two main entrances, on the e. and on the s. sides, with a postern on the w. The entire circuit of the walls still remains more or less preserved; they are more than 20 ft. in thickness—their lower courses of unhewn stones of enormous size, rudely piled in tiers one above the other, without mortar or cement, the interstics being filled with smaller stones, and the whole bedded in clay: above were courses of sun-dried brick. The upper story was probably of wood. There are several covered galleries of singular construction in the body of the wall, on the e. and the s. sides, the roof being formed by sloping the courses of masonry on each side of the passage, at an angle to each other. One of the galleries has six recesses, or niches, on the outer side of the walls, intended probably to facilitate defense. At the top the wall was covered in parts with a colonnade of wooden pillars resting on stone blocks.—Dr. Schliemann's interesting and important excavations in 1884-5 are described in his *Tiryns* (Lond. 1886).

'TIS, *tĭz:* a contr. of IT IS.

TISANE, or TISAN, n. *tĭs'ăn* [F. *tisane*—from L. *ptisăna;* Gr. *ptisănē,* barley crushed and cleaned]: a drink for a sick person; an infusion made of certain herbs, leaves or flowers, used medicinally, especially in France; diet-drink. See PTISAN.

TISCHENDORF, *tĭsh'ĕn-dorf,* LOBEGOTT FRIEDRICH KONSTANTIN VON, LL.D., D.C.L., Count: eminent biblical critic: 1815, Jan. 18—1874, Dec. 7; b. Lengenfeld, in Saxony. He was educated at the University of Leipzig, and under the influence of Winer engaged ardently in critical study of the New Test., early becoming convinced of the need of more exact collations of MSS. At Paris (1840, Oct.—1843, Jan.) his decipherment of the previously illegible *Codex Ephraemi Rescriptus* gave him his first wide repute. His journeys and labors in search of the best and rarest biblical MSS., in which he was liberally assisted by the Saxon and Russian governments, had results exceedingly valuable. From the convent of St. Catherine, on Mt. Sinai, where Tischendorf was entertained by the monks, he brought 43 leaves (of the 345½ leaves) of one of the greatest biblical treasures extant—the Sinaitic Codex. These precious leaves he accidentally

noticed in the basket of papers furnished him for kindling his fire. On a second journey 1859, he secured the remainder as a present to the czar of Russia. Among the most important of his many works are the editions of the *Sinaitic MS.* (1862-63-65), the *Eighth Critical Edition of the New Testament* (1864-72), and *Monumenta Sacra Inedita* (1855-70). After being an extraordinary and ordinary prof. at Leipzig from 1845, he became prof. of theology and of biblical paleography 1859, a chair in the latter subject having been instituted for him.

TISHRI, *tĭsh'rĭ* or TISRI, n. *tĭz'rī* [Heb. *tishri*—from Chald. *shera'*, to open, to begin]: the first month of the Hebrew civil year, and the seventh of the ecclesiastical, answering to parts of our September and October.

TISIC, TISICAL. See PHTHISIC, under PHTHISIS.

TISSANDIER, *tē-sän-dē-ā*, GASTON: French aeronaut: b. Paris, France, 1843, Nov. 21. He was the inventor of a dirigible balloon in which he made an ascent of 5⅓ m. from Paris in 1875; he alone surviving of the members of the aeronautic experiment. Besides his written contributions to the subject of aeronautics he has contributed to the *Library of Wonders* series, well known volumes on the subject of light, water, coal, and fossils.

TISSOT, *tē-sō*, CLAUDE JOSEPH: French philosopher: b. Fourgs (Doubs), 1801, Nov. 26; d. Dijon 1876, Oct. 7. He translated the larger part of Kant's writings into French. Among his original works are: *Of the Beautiful, Especially in Literature* (1830); *Short History of Philosophy* (1840); *The Mania of Suicide and of Revolt* (1840); *Parceling of the Land and Division of Property* (1842); *Principles of Morality* (1866); *Catholicism and Public Instruction* (1874); *Insanity Considered Especially in its Relations to Normal Psychology* (1876).

TISSOT, JAMES, French painter: b. Nantes 1836, Oct. 15; d. Abbey of Bouillon, 1902, Aug. 8. He was a pupil of Ingres, studied in London under Seymour Haden, and attracted attention by his brilliant pictures of fashionable women, actresses and grisettes, as in his *Promenade in the Snow* (1859). His series of etchings *Parisian Women* was very popular. He suddenly changed his whole artistic aim in life under the stress of a sudden bereavement and went to Palestine (1890) where he studied for six years the scenery and buildings and rural activities of the Holy Land for the purpose of producing a set of pictures illustrating the life of Christ. These paintings were subsequently reproduced by Lemercier in Paris under the title *La Vie de notre Seigneur Jésus-Christ;* and a parallel publication of them has been issued in this country. The original drawings and paintings, 540 in all, are now in the Brooklyn (N. Y.) Institute of Art, having been purchased from the artist for $60,000.

TISSUE, n. *tĭsh'ū* [F. *tissu*, woven—from F. *tisser;* L. *texĕrĕ*, to weave]: any woven stuff; cloth interwoven with figured colors, or with gold or silver thread; any thin and delicate texture or fabric; in *anat.* or *bot.*, the minute elementary structures of which organs are composed: a connected series, as a *tissue* of lies: V. to form tissue of; to interweave. TIS'SUING, imp. TIS'SUED, pp. *-ūa:* ADJ. variegated. TISSUE-PAPER, a very thin semi-transparent variety of paper. BAST TISSUE, modification of woody tissue in which the cells are longer and more elastic. CELLULAR TISSUE, the tissue of vegetables which consists wholly of ordinary cells and contains no vessels. VASCULAR TISSUE consists of tubes and of wood-cells usually found in bundles. WOODY TISSUE, tissue composed of long and slender cells overlapping each other.

TISSUES, ANIMAL: minute elementary structures of which animal organs and substances are composed. For the most important of these tissues, see their special titles; here is given the view now most common regarding their classification (see HISTOLOGY).—The normal tissues are divisible, according to Virchow and his followers, into three groups or categories: (1) Tissue which consists exclusively of cells; when cell lies close to cell; (2) tissue in which one cell is regularly separated from the others by an amount of intermediate matter, or intercellular substance; (3) tissue in which the cells have attained specific, higher forms of development, by means of which their construction has acquired an entirely peculiar type. As illustrations of the first group of tissue, the simple cellular tissue in the modern sense (cellular tissue here being quite distinct from areolar or connective tissue), we may take the epithelial formation —e.g., as occurring in the epidermis and the nails, and in the epithelium of mucous and serous membranes, and in the glands. The second group is formed by the connective tissue, which is composed of intercellular substance, with cells of various forms embedded in it, and includes cartilage, fatty tissue, etc. In the third group, which is somewhat heterogeneous, the structures are usually more or less tubular. This group includes the muscles, nerves, and vessels, and Virchow also places the blood in it. This whole arrangement is altogether at variance with those adopted not many years ago. *This* arrangement has reference to General Histology (*tissues*, properly so called), while the older had reference to Special Histology, or the structure of organs into which a combination of various tissues may enter. Thus, the *osseous tissue* of general histology consists of bone-cells + calcified intercellular substance, while *bone as an organ* consists of osseous tissue + medullary tissue + periosteum + vessels + nerves; similarly, nervous tissue is by no means identical with cerebral matter, which additionally contains membranes, vessels, etc.

TIT, n. *tĭt* [Norw. *tita;* Icel. *titlr*, a small bird (see **Tot**): prov. Eng. *titty*, small]: any very small thing; a small horse or woman, in contempt; one of several small birds; specifically, a Titmouse (q.v.). Tit for tat, a variation of *tip for tap*, 'blow for blow;' an equivalent by way of revenge or repartee. Tit ling, n. *-ling* [Icel. *titlingr*]: the titlark; the hedge-sparrow. Tittle, n. *tĭt'tl*, a particle, a minute part; a jot. Tit'tle-tat'tle, n. *-tăt'tl*, idle trifling talk; an idle trifling talker: V. to talk idly; to engage in senseless talk. Tit tle-tat'tling, imp. *-tlĭng*. Tit'tle-tat'tled, pp. *-tăt'tld*. Tit'lark, a small species of lark. Tit'mouse, n. *-mows* [Ger. *meise;* Dut. *mees*, a titmouse: not connected with *mouse*]: small insessorial bird of several species; plu. Tit'mice (see Tit, below).

TIT, or Tit'mouse: any bird of the family *Paridæ*. They are small birds, of which there are more than 50 known species, widely distributed throughout Europe, Asia, Africa, and N. America. The popular names Tit and Titmouse are very generally given to them by English-speaking people. They are bold sprightly birds, extremely active, flitting from branch to branch, running rapidly along branches in quest of insects, and often clinging to the underside of branches with their back downward. They feed not only on insects, but also on grain and seeds, have no objection to carrion, and sometimes kill young and sickly birds by strokes of their bill. They are very pugnacious, and the female tit shows great courage in defense of her nest, often continuing to sit when the nest is approached. In winter, many of the species gather into small flocks, and approach houses and villages. These birds are extremely useful in preventing the multiplication of noxious insects. The Crested T. (*Parus cristatus*) is a common species in Europe. The Great T. (*P. major*) is the largest European species; not quite 6 inches long. Its usual note is a kind of chatter, but it sometimes imitates the notes of other birds. The Blue T. (*P. cæruleus*) and the Coal T. (*P. ater*) are other species. The Blue Tit is perhaps the most pert and audacious of the Brit. species; it is familiarly named *Tomtit*. The upper part of the head is light blue, and a bluish tinge prevails in the plumage. The Long-tailed T. (*Panurus biarmicus*), common in Britain, has the tail about as long as the body. The Penduline T. (*Aegithalus pendulinus*) of s. Europe makes an interesting nest, which in form resembles a flask, and is generally suspended at the end of a flexible twig, near to or overhanging water. It is nicely woven of fibres of bark and the down of willow or poplar catkins, and the opening is in the side. The Chickadee or Blackcap T. (*Parus atricapillus*) is very common in N. America. The Tufted T. (*Lophophanes bicolor*) is the largest Amer. species. The Black-crested T. (*L. atrocristatus*) has a similar head-tuft. The 'bottle-tits' or 'bush-tits,' building nests like the Penduline T., are represented by small species in the s.w. United States and in Mexico, of the genus *Psaltriparus*. The Gold T. or Yellow-headed T. (*Auriparus flaviceps*) is of the same region.

TITAN, n. *tī'tăn:* in *heathen myth.*, one of the 12 sons and daughters of Heaven and Earth; the famous war of the Titans was between Jupiter, aided by his brothers and sisters, and Kronos (Cronus)—who has usually been identified with Saturn (but see SATURN)—their father, the result being the deposition of Kronos, and the establishment of Jupiter on the throne of heaven. TI'TAN, a., or TITANIC, a. *tī-tăn'ĭk*, of or relating to the Titans; superhuman; enormous.—The *Titans* or *Titanidæ* (originally called *Ouraniōnes*, Celestials), in Greek mythology, were the sons and daughters of Uranus (Heaven) and Gæa (Earth). Their names, as commonly given, were: Oceanus, Cœus, Crius, Hyperion, Iapetus, Kronos, Theia, Rhea, Themis, Mnemosyne, Phœbe, and Tethys; Dione, Phorcys, and Demeter are added by some writers. Instigated by their mother, the Titans, headed by Kronos, rose against their father, emasculated and deposed him, and liberated their brothers the Hecatoncheires (Hundred-handed) and the Cyclops (q.v.), from Tartarus. Kronos, being made king, threw the Cyclops back again to Tartarus, and married his sister Rhea. In order to escape being deposed by one of his own children, as it was foretold he would be, Kronos swallowed each as it was born. Rhea, when she gave birth to Zeus (q.v.), saved his life by giving a stone wrapped in a cloth to Kronos, who swallowed it, believing it to be his child. Zeus, when he grew up, gave his father a potion which caused him to vomit the stone and the children that he had swallowed. Assisted by his brothers and sisters, with the Cyclops and Hecatoncheires, Zeus began the ten years' conflict with the Titans, which resulted in the complete overthrow of the Titans, who were hurled down into a dungeon below Tartarus, surrounded by a brazen wall, and guarded by the Hecatoncheires.—The name T. is given also to the descendants of the Titans, e.g., Prometheus, Hecate, Helios, Selene, etc.

TITANIA, n. *tī-tā'nĭ-a* [L.]: a name of Latona, as daughter of the Titan Cœus; of Pyrrha, as a descendant of the Titan Prometheus; of Diana, as the sister, and of Circe, as the daughter, of Sol: in *Midsummer Night's Dream*, name of the wife of Oberon.

TITANIUM, n. *tī-tā'nĭ-ŭm* [Gr. *titănos*, lime, white earth]: one of the metals, allied to tin, of dark copper-red color with strong metallic lustre, found sometimes in small cubical crystals in the slag of blast-furnaces. TITANITE, n. *tī'tăn-īt*, prismatic titanium ore—better known by the name of *sphene*. TITANIC, a. *tī-tăn'ĭk*, pert. to or containing titanium. TITANIC ACID, the oxide of titanium; the form in which titanium occurs as a constituent of several minerals. TITANIFEROUS, a. *tī'tăn-ĭf'ĕr-ŭs* [L. *fero*, I bear]: containing or yielding titanic acid and titanium.—*Titanium* (sym. Ti, at. wt. 48, sp. gr. undetermined) is a comparatively rare metal, which, according to the method by which it is procured, occurs as a gray, heavy, iron-like powder, which burns with brilliant scintillations in the air, and is converted into titanic oxide; or occurs in prismatic crystals. At 212° F. it decomposes water, and it is soluble

in hydrochloric acid. It is obtained in crystalline form by heating sodium in the vapor of bichloride of titanium. It never occurs native, but is found in association with other elements in various minerals, of which the most important are *Anastase*, *Rutile*, and *Brookite*, which are different forms of titanic oxide; and in the several varieties of titaniferous iron, consisting of ferrous titanate. A remarkable artificial compound of the metal is often found in the form of copper-colored cubic crystals adhering to the slags of iron-furnaces. They are hard enough to scratch agate, and are in the highest degree infusible; and no acid except a mixture of nitric and hydrofluoric acids has any action on them; but they are volatile at an extremely high temperature. They are a compound of titanium cyanide with titanium nitride. The most important compound of this metal is *Titanic Oxide* (TiO_2), which occurs in the minerals rutile, brookite, and anastase, each of which has a distinct crystalline form and a different specific gravity. Titanic oxide is obtained usually by a somewhat complicated process from rutile.

TITANOSAURUS, *tī-tan-ō-saw′rŭs*, or ATLANTOSAURUS, *ăt-lăn-tō-saw′rŭs:* genus of mammoth lizards, belonging to the order *Dinosauria*. The remains of T. are found in the Jurassic formations of N. America. The term T. is synonymous with *Atlantosaurus*, one species of which, *A. montanus*, from Colorado, is, says Prof. Marsh, 'by far the largest land-animal yet discovered, . . . 50 or 60 ft. in length, and, when erect, at least 30 ft. in height. It doubtless lived upon the foliage of the mountain forests.'

TIT-BIT, or TID-BIT: see under TID 1.

TITE, *tīt*, Sir WILLIAM, C.B., F.R.S., F.S.A.: English architect: 1802–1873, Apr. 20; b. London. His first independent work was the Scotch Chh. in Regent's Square, London (1825). His most memorable work was the Royal Exchange. He was M.P. for Bath 1855 till his death. T. was a great book-collector; after his death his extremely valuable collection was sold for very high prices.

TITHE, n. *tīth* [AS. *teotha*, tenth; *teothian*, to tithe or take a tenth: Fris. *tienda*, tenth: Icel. *tiund*, tithe]: a tenth part; the tenth part of the produce of land and stock, in some countries allotted to the clergy, now in England commuted into a rent-charge on the land, payable in money (see TITHES): V. to tax to the amount of a tenth; to pay tithes. TITHING, imp. *tī′thĭng:* N. the act of one who tithes; the taking of tithes; in *Eng. in AS. times*, a district, the tenth part of a hundred, originally containing *ten* householders, each of whom was responsible to the king for the good behavior of the others (see HUNDRED). TITHED, pp. *tīthd:* ADJ. in *OE.*, paid as tithe. TITHING-MAN, the officer of a town; a parish officer; a constable TI′THABLE, a. *-thă-bl*, subject to the payment of tithes. TI′THER, n. *-thėr*, one who tithes or collects tithes. TITHE-COMMISSIONER, one of a board of officers in England to whom all matters pertaining to tithes are referred for settlement. TITHE-FREE, exempt from the payment of tithes.

TITHES: tenth part of the produce of the land, set aside by ancient usage, and subsequently by law, for support of the ministers and observances of religion. This provision for the priesthood passed at a very early period from the Jewish into the Christian Church; indeed, the same or a similar appropriation is traceable in the other ancient religions. It is observable under the patriarchal system, in the words of Jacob (Gen. xxviii. 22), and in the offering of Abraham to Melchizedek (Gen. xiv. 20); and mystical reasons have been devised for the selection of the tenth part, rather than any other fractional portion of the produce of the earth, to be consecrated to the uses of religion and the ministers of religion (see Spencer, *De Legibus Hebræorum*, iii. 1–10). The details of the institution among the Jews are given in Lev. xxvii., Deut. xiv., and many other places in the Old Test. The tribe of Levi not having lands assigned, as was the case with the other tribes, drew their support from this impost.

In the Christian dispensation, the existence of a class of persons devoted to the work of guiding and superintending the church necessarily supposed some provision for their maintenance; and this necessity is distinctly expressed in the New Test. (see Matt. x. 10; Luke x. 7; Rom. xv. 27; I Cor. ix. 7–14). The obligation thus involved has been set forth in ecclesiastical legislation from the earliest period. The apostolical canons, the apostolic constitutions, St. Cyprian on *The Unity of the Church*, and the works of St. Ambrose, St. Chrysostom, St. Augustine, and the other Fathers of both divisions of the church, abound with allusions to it. This obligation, however, was discharged mainly in the form of voluntary offerings; and the legislation of the first Christian emperors, while recognizing the duty of maintaining the clergy (as they had then come to be termed), and assigning lands and other property for their support, made no general enactment of tithes. The Council of Tours, 567; the second Council of Macon, 585; that of Rouen, 650; of Nantes, 660; of Metz, 756; and some others, distinctly sanctioned T.; and at length Charlemagne by his capitularies formally established the practice within those portions of the ancient Roman empire to which his legislation extended.

From this and other sources, the payment of a tenth to the church extended throughout western Christendom. By some the claim was held to be of divine law; by others, of human institution; but, in the gradual progress of relaxation, the right established solely for the church began to be usurped by nobles or other powerful laymen for themselves and for purely secular uses: see IMPROPRIATION.

The introduction of tithes into England is ascribed to Offa, King of Mercia, in the close of the 8th c. The usage passed into the other divisions of Saxon England, and was in the end made general for all England by Ethelwulf. By a decretal of Innocent III., addressed to the abp. of Canterbury 1200, all were required to pay T. to the clergy of their respective parishes, and this parochial distribution of T. has ever since obtained in England. The ancient

canon and civil law distinguishes many varieties of T. e.g., royal, indominicate, fiscal, salic, etc. In England, in later times, T. were of three kinds—*predial, mixed,* and *personal: predial,* arising immediately from the earth itself, e.g., grain of every kind, fruits, and herbs: *mixed,* proceeding from things nourished by the earth, e.g., calves, lambs, pigs, colts, chickens, milk, cheese, eggs, etc.: *personal,* arising from profits of personal industry in a trade, profession, or occupation; though it is commonly held that personal T. were paid ordinarily as a voluntary offering at Easter or some other period. T. were not held due from the products of mines or quarries, nor from houses, nor from wild animals, nor from tame animals kept for pleasure and not for profit. There was also an arbitrary distinction into *great* and *small* T., the *great* being T. of corn, hay, wood, etc.; the *small* being the other kinds of predial T., as well as all personal and mixed T. This distinction was important, inasmuch as the great T. of a parish belong to the Rector (q v.), and the small T. to the Vicar (q.v.). T. were originally paid 'in kind'—i.e., by actual numeration of the products of the land, and apportionment in each of the numerical tenth part, as of the tenth sheaf, the tenth lamb, calf, etc. The inconvenience and trouble of this mode early led to attempts to provide modes of commuting the payment, which took various forms—voluntary and unsystematic, yet recognized by law. Gradually the modes of exaction became recognized as liable in many cases to be oppressive, also as giving rise to disputes; and in some cases the collection could not be enforced.

A measure for commutation became absolutely necessary, and passed into law 1838. Various statutes for England or Ireland have since been enacted: their object for England is to substitute for all the other forms of payment a money rent charge, varying on a scale regulated by the average price of corn for seven years. This commutation may be either voluntary, or effected by the tithe commissioners, according to a valuation. Similar arrangements have been made in the few Rom. Cath. countries in which T. continue to be paid.—See CHURCH RATES: PARISH.

In Ireland, the settlement was effected by a general commutation of tithe into a money rent-charge, regulated by a valuation of the tithes (one-fourth being deducted for cost of collection), and payable by the proprieters, who should receive it from the occupiers of the land. Afterward this rent-charge became vested in the commissioners of church temporalities, with power to sell such rent-charge to the owner of the land charged therewith at 22½ years' purchase.

TITHONIC, a. *tĭ-thŏn'ĭk* [Gr. *Tithōnos;* L. *Tithōnus,* in anc. myth., a son of Laomedon, consort of Aurora, endowed with immortality]: pertaining to or denoting those rays of light which produce chemical effects; actinic. TITHON'ICALLY, ad. *-lĭ.* TITHONICITY, n. *tī'thŏn-ĭs'ĭ-tĭ,* that property of light by which it produces chemical effects; actinism.

TITHONUS, *tī-thō'nŭs*, in Greek Mythology: son of Laomedon, brother of Priam, and spouse of Eos, the goddess of Morn. The story is that Eos, in asking from Zeus immortality for her spouse, forgot to ask at the same time eternal youth; so that in his old age he became completely shrunk and decrepit, whereby his 'cruel immortality' was rendered a burden to him, until, in answer to his prayer for deliverance, he was turned into a grasshopper.

TITIAN, *tĭsh'an*, or TIZIANO, *tē-tsē-â'no*, VECELLIO, *vā chĕl'lē-o*, or VECELLI, *vā-chĕl'lē:* head of the Venetian school, and one of the greatest painters that ever lived: 1477–1576, Aug. 27; b. at Capo del Cadore, in the Friulian Alps; of a good family. His predilection for drawing caused his father to send him to Venice at the age of ten, that he might learn to be a painter. His instructors were Sebastiano Zuccati and the two Bellinis, particularly Giovanni; but the painter that most influenced his style was Giorgione (q.v.), with whom for a time he had a sort of partnership. So vivid and keen was his appreciation of the distinctive features of any artist's work, that he never failed to reproduce them with striking fidelity, and even to leave the impression that he had surpassed the master whom he imitated. It has been said (though on insufficient evidence) that this irrepressible superiority broke the friendship between T. and Giorgione. The first work that brought T. prominently into notice was his completion of the *Homage of Frederick Barbarossa to Pope Alexander III.* (1512), begun by Giovanni Bellini, and left unfinished at his death. The Venetian senate, who had ordered the piece, were so much pleased with T.'s performance that they conferred on him an office with an annual salary of 300 crowns. In 1514 he painted a *Bacchus and Ariadne*, and similar works for the Duke of Ferrara, a portrait of the duke himself, besides a picture of the *Tribute-money.* While at the court of Ferrara, he made the acquaintance of the poet Ariosto, who sat to him for his portrait. On his return to Venice, he painted an *Assumption of the Virgin*, one of his grandest achievements, now in the Venetian Academy. His reputation now rose to the highest point—giving him a position higher, perhaps, than that of any other painter on record, except Raphael, Michelangelo, and (later) Rubens. Pope Leo X. and Raphael both invited him to Rome, and Francis I. to France; but he declined. The most celebrated of his many productions 1520-30 were: *St. Peter, Martyr*, a work of unsurpassable beauty; *Victory of the Venetians over the Janizaries;* and *St. Sebastian.* In 1530 his friend Pietro Aretino (q.v.), the poet, introduced him to Emperor Charles V., whose portrait he painted at Bologna, and who gave him several other commissions. From Bologna T. went to Mantua, where he executed a great number of works for Duke Frederico Gonzaga. He did not visit Spain, though several of his masterpieces are now in that country. In 1537 he executed an *Annunciation;* 1541, *Descent of the Holy Ghost upon the Apostles, Sacrifice of Abraham, David and Goliath,* and *Death of Abel;* and 1543, pictures of the

A PORTRAIT BY TITIAN.

Virgin and *San Tiziano*, and portraits of Pope Paul III., Cardinal Farnese, and Duke Octavio Farnese, at Rome, where he remained three years. Emperor Charles V. twice called him to Augsburg (1547 and 50). Among his religious works for Philip II. of Spain are a *Last Supper*, *Christ in the Garden*, *St. Margaret with the Dragon*, and *Martyrdom of San Lorenzo;* besides *Venus and Adonis*, *Danaë*, *Medea and Jason*, and other classic subjects. A complete catalogue of T.'s works does not exist, but the number known is extraordinarily great—more than 600. T. died of the plague, in Venice, where, out of a pop. of 190,000, 50,000 died at that time: he had attained the age of 99. —He is best studied at Venice or Madrid, but splendid specimens of his work are in the chief European galleries. As above observed, he had at first a tendency to reproduce the style of acknowledged masters; but his surpassing genius soon emancipated itself from all imitativeness, and displayed a glorious originality and power. He was not, like Michelangelo a universal genius; he had not supreme creative invention, nor sublimity of intellect: his greatness was in painting. As a manipulator of color, and in his whole technical art, for general force and harmony of effect, he has never been matched. The luxury of light did never so enrich a painter's canvas: this is, indeed, his transcendent excellence. His minor merits of design, fertility in invention, felicity in composition, are thrown into the shade by the splendor, boldness, and truth of his coloring, which alone has sufficed to give him a place with the greatest names in art, Raphael, Leonardo da Vinci, and Michelangelo.—See Hume's *Notices of the Life and Works of Titian* (Lond. 1829); Northcote's *Life of Titian* (Lond. 1830); and *T.: his Life and Times*, by Crowe and Cavalcaselle (Lond. 1876).

TITICA'CA, Lake: see Peru.

TIT'IENS, Teresa: see Tietjens.

TITILLATE, v. *tĭt'ĭl-lāt* [L. *titillātus*, pp. of *titillārĕ*, to tickle: F. *titiller*]: to tickle. Tit'illating, imp.: Adj. tickling. Tit'illated, pp. Tit'illa'tion, n. *-lā'shŭn* [F.—L.]: the act of tickling or state of being tickled; any slight pleasure.

TITIVATE, v. *tĭt'ĭ-vāt:* in *slang*, to make neat or smart; to tidy; also Tittivate.

TIT'LARK and TIT'LING: see Pipit.

TITLE, n. *tī'tl* [OF. *title*—from L. *titŭlus*, a superscription, a title: It. *titolo;* F. *titre*, a title]: an inscription put over a thing as the name by which it is to be known; the inscription at the beginning of a book intimating the subject of the work and usually the author's and publisher's names; a general head containing particulars; a name; an appellation; a name of honor or dignity; a claim of right; that which is the foundation of ownership, as to an estate or house: the written document that proves a right; in *Chh. of Eng.*, the presentation to a curacy which enables a candidate to request ordination: V. to call; to name. Ti'tling, imp. *-tlĭng*. Titled, pp. *tī'tld:* Adj. having a title or

name of honor. TITLE-DEEDS, written instruments setting forth a man's title or right to property; written evidences of ownership of real property. Each owner is supposed to be in possession of his own T.-deeds, and their ownership passes along with that of the lands themselves. It is dangerous to part with T.-deeds, for by merely pledging them as security for money an equitable lien on the lands may be created. TITLE-PAGE, the first page of a book containing the title. TITLE-RÔLE, the character or part in a play which gives name to the play.

TITLE, REGISTRATION OF: entry in public records of all transfers of real estate. In all the states of the Union, such registration is required by law as a perpetual record of transactions affecting title to real estate. Hence, in the United States, the registers of the county clerk's (or like functionary's) office must possess the evidences of all transfers of real-estate title by way of purchase, gift, etc., though not of passage of title by descent: see RECORD OF CONVEYANCES.—In England, where no general system of registration exists, the complexities of transfer of title are very great; and, in that country, conveyancers, afraid to commit an error by omitting or abridging any of the ancient forms, repeat them with additions (for greater safety). Hence from time to time the legislature interferes to sweep away excrescences and to provide brief and simple forms. But though much has been done in this way to make transfer of title easy and sure, conveyancing in England is still encompassed with needless difficulty. An important step in reform—intended to be followed by others in time—was the passing of the Land Transfer Act, 1875, which *allows* registration of title whether possessory or absolute.

TITLES OF HONOR: designations to which certain persons are legally entitled by possession of particular dignities or offices. King and Emperor are T. belonging to the sovereigns of various countries; and Your Majesty is the form of address to which, by the usage of most European countries, they are entitled. Your Grace was in England, in former times, the usual address for the sovereign. The epithet Majesty (from the *majestas* of the emperors of Rome) was adopted by the emperors of Germany, who considered themselves successors of the Roman emperors; but its use by other European sovereigns is comparatively recent: Henry VIII. was the first king of England, and Henry II. the first king of France, who adopted it. Your Highness is the style adopted by the sultan of Turkey. The proper style (in full) of the reigning sovereign of the United Kingdom is, 'Victoria, by the Grace of God, of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith, Empress of India.' The sons of the sovereigns of England are styled Princes, and their daughters Princesses; and the sovereign's eldest son is Prince of Wales (q.v.). The title Royal Highness is given to all the children of the sovereign; and by letters patent under the great seal 1864, Feb., her majesty declared her pleasure that the children of the sons of the sovereign should also receive the same title. The different grades of the peerage

have their several titles--Duke, Marquis, Earl, Viscount, and Baron—each of which was in its origin a name of office involving certain specific duties. For practical directions, see FORMS OF ADDRESS.

Though most European countries have their dukes, marquises, counts, viscounts, and barons, these often differ considerably in rank from the seemingly corresponding titles in Britain, and the English rules and practices regarding title are not applicable in other lands. The complicated system of titles by law, and still more by courtesy (see COURTESY TITLES), in England, is a source of perplexity to foreigners.

TIT'MOUSE: see TIT: CHICKADEE.

TITTER, n. *tĭt'tẽr* [imitative of a succession of sharp thin sounds: Dut. *tateren*, to make a rattling sound, to stutter: Icel. *titra;* Ger. *zittern*, to tremble, to shiver]: a restrained or nervous laugh; a giggle: V. to laugh in a restrained or nervous manner. TIT'TERING, imp.: N. restrained laughter. TIT'TERED, pp. *-tẽrd.*

TITTLEBAT, n. *tĭt'tl-băt:* the Stickle-back (q.v.).

TITTLE, TITTLE-TATTLE, etc.: see under TIT.

TITULAR, a. *tĭt'ū-lẽr* [F. *titulaire*, titular—from L. *tĭt'ŭlus*, a title]: existing in name or title only; having the title without possession or enjoyment; nominal: N. a person invested with a title to an office, but who does not discharge its duties. Thus, the English kings styled themselves kings of France from the time of Henry IV. till 1800; and previous to the recent changes in Italy, the king of Sardinia, as well as the king of Naples, was titular king of Jerusalem. In English ecclesiastical law, a titular is a person invested with a title, in virtue of which he holds a benefice, whether he performs its duties or not.—In the law of Scotland, the term has a different acceptation: see TEINDS.—In the Rom. Cath. Church there are many titular dignities; but the class most noticeable has grown out of the separation between the Eastern and Western churches. The Roman pontiff claims authority over the entire extent of Christendom; and even where there is not any longer resident within the limits of an ancient church or province a body of Christians of the Roman communion, the pope claims to appoint an ecclesiastic to be bishop, metropolitan, primate, or patriarch of the ancient see (see IN PARTIBUS INFIDELIUM). In Britain, where archbishops and bishops of the Rom. Cath. Church exist *de facto*, but not *de jure*, they are styled titular. TIT'ULARLY, ad. *-lĭ.* TIT'ULAR'ITY, n. *-lăr'ĭ-tĭ,* state of being titular. TIT'ULARY, a. *-lẽr-ĭ*, pert. to a title: N. one who has a title or right.

TI'TUS (TITUS FLAVIUS SABINUS VESPASIANUS, *tī'tŭs flā'vĭ-ŭs sa-bī'nŭs vĕs-pā-sĭ-ā'nŭs*), Emperor of Rome, 11th of the 12 Cæsars: 40, Dec. 30—81, Sep. 13 (reigned 79–81); b. Rome; eldest son of Vespasianus (q.v.) and Flavia Domitilla. Brought up at the court of Nero with Britannicus, son of Emperor Claudius, he received an excellent training both of body and mind; became adept in manly

exercises, and an accomplished scholar; and subsequently, as *tribunus militum* in Germany and Britain, and commander of a legion in Judæa under his father, proved his qualities as a soldier and a general. On his father's elevation to the imperial throne, T. was left to prosecute the Jewish war, which he brought to a close by the capture of Jerusalem after a long siege. The news of the success was received with the utmost joy, and Vespasian's too suspicious temper was awakened. However, T., by returning to Rome and laying the trophies of victory at the emperor's feet, removed his unfounded jealousy, and father and son obtained the honor of a joint triumph A.D 71. About this time T. became his father's colleague in the empire, and the impression which the conduct of the young conqueror made upon the Roman people was very unfavorable. He gave himself up to all forms of pleasure, put to death various suspected persons very summarily, and even caused one of his guests, whom he justly suspected of conspiracy, to be assassinated as he left the palace. His *liaison* with the shameless beauty Berenice, daughter of Herod Agrippa I. (q.v.), was very distasteful to the Romans; and on the death of his father (79), whom a few then believed T. to have poisoned, the Romans considered that they had evidence of the advent of a second Nero. But T.'s behavior after his hand grasped an undivided sceptre strangely belied their anticipations. The first act of his reign was to stop all prosecutions for *læsa majestas*, which had abounded since the time of Tiberius (q.v.); informers were scourged in the forum, dragged along in front of the theatres, and then either sold as slaves or banished. The ancient and venerated buildings of Rome were repaired; new ones, as the Colosseum (see AMPHITHEATRE) and the baths which bear T.'s name, were erected; and the prominent tastes of the populace were abundantly gratified by games on the most stupendous scale and continuing 100 days. T.'s beneficence was unbounded, and by reason of great disasters during his brief reign there was urgent need of it. In 79 was the great eruption of Vesuvius, which overwhelmed Herculaneum and Pompeii, and ruined many other towns and villages; in 80 a fire broke out in Rome, which raged three days, destroying the Capitol, Augustus's library, Pompey's theatre, and numerous houses; and in the tracks of these calamities followed a dreadful pestilence. T. dealt out gifts with lavish hand to the houseless and ruined sufferers; he even despoiled his palaces of their valuable ornaments to obtain money for distribution, and schemed and planned to furnish occupation for them. He became the idol of his subjects, the 'love and delight of the human race;' but, in the beginning of the third year of his reign, a sudden illness caused his death at his patrimonial villa in the Sabine country, not without the suspicion of poison by Domitian, his younger brother.

TITUS.

TITUS, *tī'tŭs:* companion and assistant of the apostle Paul, to whom the latter addressed one of his epistles. He accompanied Paul on his missionary tour in Asia Minor and Macedonia; twice he was Paul's envoy to the church of Corinth. He was for a time in charge of the churches in Crete. Later, Titus was sent into Dalmatia, and thereafter is not mentioned in the New Testament.

TITUS, ARCH OF: an arch erected at Rome in honor of the victory won by the Emperor Titus over the Jews. It is situated on the prominent part of the Via Sacra, about 20 yards above the Tiber, facing on the one side the Forum and on the other the Colosseum. It was restored in its lateral portions by Pius VII. It consists of a single arcade adorned with sculptured crowns and tympans. Three bas-reliefs adorn the structure. One represents Titus, crowned by Victory, standing upright in a car drawn by four horses and led by a female figure personifying Rome. The second shows Roman soldiers, without weapons, but laurel-crowned, carrying the spoils of the temple—two tablets fastened on staffs, the seven-branched candle-stick, and the golden table, upon which rest the holy trumpets. The third presents Titus seated on an eagle, as he is shown in medals struck in his honor. In the triumph at Rome after the fall of Jerusalem, 700 Jews of superb physique, and the leaders of the zealots, John of Giscala and Simon bar Giora took part in the procession. Two triumphal arches were raised to Titus, but only one has been preserved.

TI'TUS, EPISTLE TO: one of the three 'Pastoral Epistles' in the New Testament, written by the apostle Paul, probably in the latter part of his life, and after he had been liberated from his first imprisonment at Rome; though the question as to the time to which the writing of this letter can be assigned has not been satisfactorily answered. The apostle was staying at Nicopolis when he wrote the letter (see iii. 12); and the subscription identifies this place with Nicopolis of Macedonia; but this is impossible, for, as De Wette notices, that city appears to have been founded by Emperor Trajan long after the apostle's death. Jerome's opinion is probably correct, that the Nicolopis referred to was the famous city in Epirus.—The epistle concerns itself mainly with the organization and discipline of the church in Crete; is very practical, and at times sharp in its tone, as if Paul had felt more acutely than usual the vexations which 'unruly and vain talkers and deceivers, *specially they of the circumcision,*' caused him. Above all things, however, he is solicitous that the Christians of Crete should shun the immoral practices of heathenism.—From the days of Eichhorn, the Pauline authorship of this and the other Pastoral epistles (see TIMOTHY, EPISTLES TO) has been disputed by some scholars on the ground of their differing from Paul's epistles not merely in style

but in doctrine: the weight of critical judgment, however, remains in their favor.

TITUSVILLE, *tī'tŭs-vĭl:* city in Crawford co., Pa.; on Oil creek, and on the Western New York and Pennsylvania and the Dunkirk, Allegheny Valley and Pittsburgh railroads; 28 m. e. of Meadville, 90 m. s. of Dunkirk, It is tastefully laid out on a plateau sloping to the s.; has thorough drainage, excellent water by the Holly system, gas and electric light plants, handsome municipal building, several hotels, fine opera-house, and high and graded public schools; several churches, banks, and daily and weekly periodicals. The first petroleum well in North America was drilled on Oil Creek, when Col. Drake struck petroleum oil here in Aug., 1859; the first refinery was built 1861, and the place was incorporated 1867. The industries comprise manufacture of every article and tool employed in production and refining of oil; and here one may see the whole process of the petroleum industry from the pumping at the wells to the shipment of the refined oil. Pipe lines convey the petroleum to different cities.—Pop. (1900) 8,244; (1910) 8,533.

TIUI, or TIVI, Philippines: pueblo, province of Albay; on the n.e. coast; 23 m. n. by w. from the pueblo of Albay. It is the centre of a hemp growing region, and exports hemp by way of Tabaco. It is especially celebrated for its thermal springs of iron and sulphur waters with medicinal properties, which are visited by large numbers of natives.

TIUMEÑ, *tyoo-mĕny'*, Russia: in Siberia, government of Tobolsk, 90 m. s.e. of Tobolsk, on the Tura river. It is an important centre of trade, lying on several commercial routes, with railroad communication. It has a large technical school. Its principal manufactures are leather, soap, candles, carpets, pottery and woolen goods. These articles are exported to China, the Kirghiz steppe, Bokhara and everywhere in Siberia. The Tiumeñ carpets are especially renowned, and are hand-work. In Tiumeñ is located a famous exile prison. Pop. about 35,000.

TIVERTON, *tĭv'ėr-ton:* municipal borough in n.e. of Devonshire, England; 14 m. n. of Exeter, 184 m. w.s.w. of London. There are important weekly markets, and four great annual markets for cattle. There is a large lace factory, employing more than 1,000 hands. The town is on a hill between the rivers Exe and Lowman; hence the old names of the town, TWYFORD and TWOFORDTOWN. The streets in many places are very narrow, but clean. Rapid streams of water flow down the channels along the sides of the streets—a gift to the town about 1262, by Amicia, Countess of Devon. The castle was built 1106. The free grammar school, an old building in the Elizabethan style, was endowed by Peter Blundell 1604: in connection with the school are scholarships and exhibitions at Oxford and Cambridge.—Pop. 10,500.

TIVOLI, *tē'vō-lē,* Italy: in the province and district of Rome, on the Teverone or Anio, 24 m. n.e. of the capital. Its position on a rocky height overlooking the river is extremely picturesque. Tivoli commands a fine view of Rome and the Campagna. It contains a fine modern cathedral which contrasts sadly with the other town buildings. Its antiquities are numerous and interesting, and include a temple of the Tiburtine sybil, temple of Vesta, villa of Hadrian, etc. The artificial cascades formed by the Teverone constitute an interesting feature of the landscape and supply power for the electric lighting of Rome, and for various factories. Tibur was one of the most venerable towns of Latium, and important in the Latin Confederation. It became subject to Rome in 338 B.C. Pop. (1900) 11,500.

TIVY, ad. *tĭv'ĭ:* contr. of TANTIVY (q.v.).

TIZA, n. *tī'zā:* the name given to borate of lime in southern Peru, where it is found on the dry plains in white reniform nodules.

TLAXCALA, *tlâs-kâ'lâ,* or TLASCALA, Mexico: the smallest state in the republic, situated between the states of Puebla, Hidalgo, and Mexico. Area, 1,596 sq.m. The capital, Tlaxcala, was in ancient time a large city, but its present population is only 2,715. The state lies within the plateau region, and its surface is broken by high mountains. The principal occupations are agriculture and some manufacture of cloth, though iron and silver are found in the mountains. Tlaxcala was at the time of the Discovery, a powerful native state which had maintained its independence of the Aztecs. It became an ally of Cortes and retained its own government for a time under the Spaniards. Pop. (1900) 172,315, almost all Indians.

TLEMCEN, *tlĕm-sĕn',* Algeria: in the province of Oran, 70 m. s.e. of the city of Oran. It is a walled town with nine gates, and is divided into three sections, namely, the citadel and military establishment; the business portion, containing the residences of foreigners; and the native section. The town stands amid olive-groves and vineyards. It has 32 mosques, Protestant and Catholic churches, a museum, and Jewish synagogue. The manufactures comprise textiles, carpets and leather articles, burnooses, etc. Trade is important, especially with Morocco. Pop. (1901) 22,273.

TMESIS, n. *tmē'sĭs* [Gr. *tmēsis,* a severance—from *temnō,* I cut]: in *gram.,* the division of a compound word into two parts, and the insertion of one or more words between them; Diacope (q.v.).

TO, prep. and ad. *tô* or *tû* [Dut. *toe;* Ger. *zu,* to]: in the direction of; unto; toward, denoting motion toward a place, point, object, position, or state; as far as, denoting limit reached; upon; besides, denoting addition; for, denoting adaptation; in harmony with, denoting accord, as, true *to* life; against, denoting opposition,

as, to bet 10 *to* 1; compared with; the sign or prefix of the infinitive of a verb; the particle coming between two verbs to show that the second is the object of the first; used after a verb to modify its meaning, as, he comes *to*, to fall *to:* in *colloquial usage*, the infinitive is often understood, and only *to* expressed, as 'he orders me to go, but I do not wish to' (*go* being understood). TO-DAY, n. ad. this day. TO-NIGHT, n. ad. this night. TO-MORROW, n. ad. the morrow. TO AND FRO, backward and forward. TO THE FACE, directly; in presence of; in defiance of. TO WIT, to know; namely; 'that is to say.' *Note.*—'*To* was originally used not with the infinitive, but with the gerund in *-e*, and, like the L. *ad* with the gerund, denoted a purpose. Thus *to love* was originally *to lovene*, i.e., to (or toward) loving, L. *ad amandum*.' —Abbott's *Shakespearian Grammar*.

TOAD, n. *tōd* [Dan. *tudse*, a toad: Icel. *tutna*, to swell: prov. Eng. *tote*, to bulge out]: reptile resembling the frog, but without its activity, named from the creature's habit of puffing itself up with air (see below). TOAD'ISH, a. *-ĭsh*, in *OE.*, like a toad. TOAD-EATER, n. *originally*, the assistant to a mountebank, who ate or pretended to eat poisonous toads, in order to give his master an opportunity of showing his skill in extracting the poison; hence, a fawning obsequious parasite; a servile flatterer. TOAD'Y, n. *-ĭ*, a sycophant; a mean flatterer or hanger-on; TOAD'IES, n. plu. *-ĭz:* V. to fawn upon with servile flattery; to display obsequiousness toward. TOAD'YING, imp. TOAD'IED, pp. *-ĭd*. TOAD'YING, n. *-ĭ-ĭng*, or TOAD'YISM, n. *-ĭzm*, servile flattery; the practice of meanly fawning on another. TOAD-STOOL, name applied to various species of fungi; general name for *Agarics* and *Bolētī*.

TOAD: a batrachian mostly of the genus *Bufo:* see BATRACHIA. The form resembles that of the frogs, but is more thick and clumsy, and the hind-legs are generally short, so that the species rather crawl than leap; the hind-toes are webbed slightly or not at all. The skin is warty, and the warts or tubercles produce a milky exudation, which in some species is very fetid. Behind the ear is a porous pad—a very large parotid gland—from which copious exudation takes place. The mouth of the true toads is destitute of teeth. The food of toads consists chiefly of small insects and slugs, and they mostly inhabit shady places. In their adult state, they are much less aquatic than frogs, but their spawn is deposited in water, in which their tadpoles live for a brief time, while small. A notion has very generally prevailed that the exudation of the skin is venomous, but toads are handled with perfect impunity. They are eaten by some savage tribes.—Only two species are British. The COMMON TOAD (*B. vulgaris*) is abundant in most parts of Britain and in w. Europe, but is not found in Ireland. Its spawn resembles that of the frog, but the ova are

smaller and more numerous. Toads are very useful in gardens, in preventing the excessive increase of some kinds of insects; and the market-gardeners of the neighborhood of London often purchase them at the price of fourpence each. They have occasionally been tamed. A tame toad, of which an account is given by Pennant in *British Zoology,* lived more than 40 years, and was at last killed by a raven.

Numerous instances are on record in which toads are said to have been found imbedded in rocks, walls, and even in the trunks of trees, where the necessary conclusion is that they must have lived a very long time in a dormant state. Unfortunately, however, the discovery of these toads has almost always been by unscientific persons; but it is possible that in a very young stage a toad may find its way through a small crevice, which also admits insect food or nutriment in some form: see an interesting account of Dr. Buckland's experiments in Buckland's *Curiosities of Natural History.*—The other Brit. species of toads is the NATTERJACK (*B. calamita*), called also the Running Toad; it never hops, and its motion is more like walking or running than the crawling of the common toad.—Several other species of toads are found in Europe. Some found in tropical countries attain very large size, and exhibit protuberances of various kinds, far exceeding the warty excrescences of the common toad.

The COMMON TOAD of North America is *B. lentiginosus,* formerly assigned to several species before its varieties of color were understood. The SPADE-FOOTED TOAD (*Scaphiopus Holbrooki*) of e. North America is named from foot-appendages useful in digging; it is very noisy in spring. A similar species occurs in the Rocky Mt. region. The so-called Horned Toad of the west is a lizard. The Obstetrical Toad of Europe (*Alytes obstetricus*) is so named because the male winds the string of eggs around his legs until they are hatched. The Cell-backed Toad of Surinam (*Pipa Americana*) is remarkable for cells in the back of the female into which the male puts the eggs, where they remain until hatched. In several species in South America the female receives the eggs into a pouch, as occurs in kangaroos, but of course without the nourishing apparatus of the latter; the genus is *Notrotema.*

TOAD'-FISH. See FROG-FISH.

TOAD'FLAX: herbaceous plant of the genus *Linaria,* nat. order *Scrophularineæ,* very closely allied to SNAP-DRAGON (q.v.), distinguished chiefly by the spur at the base of the corolla, and the capsule opening by valves or teeth, not by pores.—The species are natives chiefly of colder and temperate parts of the old world. Some are natives of Britain, of which the most common is *L. vulgaris,* a species with erect stem 1-3 ft. high, glaucous linear-lanceolate leaves which thickly cover the stem, and

terminal spikes of yellow flowers. It grows in hedges, the borders of corn-fields, etc. It has purgative and diuretic properties, and a decoction of it is used as a fly-poison; but it is regarded as a troublesome weed by farmers. It has found its way, probably with grain or other grass seeds, into the United States. A remarkable monstrosity is sometimes seen in this plant, to which the name *Peloria* has been given, the flower presenting five spurs and five usually imperfect stamens.—*L. Cymbalaria* a pretty little plant with trailing stems and 5-lobed cordate leaves, is often planted to cover old walls, etc., and is either a native of Britain or naturalized in many places.

TOADSTONE, n. *tōd'stōn* [Ger. *todstein,* dead stone—that is, stone containing no ores]: among *Derbyshire miners,* certain trap-rocks which occur interstratified, or in connection with the mountain limestones, void of ore: [from Eng. *toad*]: a stony concretion or jewel, fabled to be found in the head of the toad; a kind of amygdaloid, so called from its mottled aspect resembling the skin of a toad.

TOAST, v. *tōst* [OF. *toster;* It. *tostare,* to toast or parch—from L. *tostus,* pp. of *torrērĕ,* to dry, to scorch]: to dry and scorch by the heat of a fire, as bread or cheese; to warm thoroughly: N. bread scorched or browned before the fire. TOAST'ING, imp. TOAST'ED, pp.: ADJ. scorched by heat, as bread or cheese. TOAST'ER, n. *-ėr,* an instr. for toasting bread, cheese, etc., before the fire—also TOASTING-FORK. TOAST-RACK, a small light stand, generally of metal, having partitions, in which dry slices of toast may stand upright.

TOAST, v. *tōst* [probably from the Ger. cry *stoss an*—that is, *clink*—the Ger. topers knocking their glasses together when they pledge each other]: to drink to the health or honor of; to drink in honor of anything, or to its prosperity; to name a health to be drunk: N. the person or thing named whose health and prosperity are to be drunk to; the call to drink to the health of another, or the sentiment uttered on such an occasion; a person frequently toasted; hence, the belle of the place or season (see TOASTING). TOAST'ING, imp.: N. the practice of drinking toasts. TOAST'ED, pp. TOAST'ER, n. *-ėr,* one who toasts. TOAST-MASTER, a person at a public dinner who announces the toasts and leads the cheering.

TOASTING: practice of drinking to the health or honor of any one. This practice, probably ancient, received an artificial development by the convivial habits of the 17th century: then it became the fashion to drink to the health not only of entertainers, but also to that of each guest, of absent friends, and especially of the unmarried woman whose attractions were most generally acknowledged. Whatever may have been the origin of the use of the word 'toast' as applied to the person thus honored, it is now applied to any person or to any sentiment mentioned with honor before drinking.

TOBACCO.

TOBACCO, n *to-bak'ko* [the American Indian name *tabaco*, for the pipe or tube in which the natives smoke the plant, transferred by the Spaniards to the plant itself: Sp. *tabaco:* F. *tabac*]: highly narcotic and poisonous plant, indigenous in America, but extensively grown elsewhere: the dried and prepared leaves of the plant, much used in smoking and chewing, and in the manufacture of snuff. TOBAC'CONIST, n. *-nist*, one who manufactures the leaves of the tobacco-plant, or who sells the various manufactured forms of it: in *OE.*, a tobacco-smoker.—*Tobacco* is a plant of the genus *Nicotiana*, nat. order *Solanaceæ;* having large broad leaves, a 5-parted calyx, a funnel-shaped, 5-lobed corolla, and five stamens; the flowers growing in panicles at the top of the stem; the fruit a 2-celled, 5-valved, many-seeded capsule. The species of *Nicotiana* are mostly herbaceous plants, rarely shrubby, with large broad leaves, and everywhere covered with clammy hairs. They are natives of warm countries, most of them American, though some are found in the E. Indies. They all have the narcotic property, on account of which a few are extensively cultivated. It resides in almost all parts of the plant, though the leaves are almost exclusively used. The most important species is the COMMON T., or VIRGINIAN T. (*N. tabacum*), native of warm parts of America, whose cultivation had extended, before the discovery of the new world far to the n. of the regions in which the plant appears to be indigenous. It is about 5 or 6 ft. high, erect, with lanceolate, sessile leaves, 6–18 inches long, and rose-colored flowers, the throat of the corolla inflated, the segments pointed. There are a large number of varieties, differing in size and form of leaves and in form and color of flowers, some of which are regarded by some botanists as distinct species. Nearly every T.-growing district of the United States has its special variety of Seed-leaf T. which has been grown from native seed. Havana Seed-leaf and the Gadsden, both produced from seed originally imported from Cuba; the Perique, grown in La.; and the White Burley, which originated in O., are also popular in certain sections. The GREEN T. (*N. rustica*), sometimes called ENGLISH T. because it was the first kind introduced into England for cultivation, grows 3 to 5 ft. high, with ovate, stalked leaves, and the segments of the corolla rounded, its tube cylindrical. It is a native of the East, but is quite hardy, and therefore cultivated in more northern regions. The PERSIAN T. (*N. Persica*) has the root-leaves oblong, those of the stem lanceolate and sessile; the corolla salver-shaped, with a long tube; its lobes rather unequal. It is a native of Persia, and furnishes the Shiraz T., esteemed in the East, and milder than the common T. Other species are used in different parts of America, and some are cultivated to a small extent, as *N. repanda*, in Cuba; *N. quadrivalvis*, by the Indians on the Missouri; *N. multivalvis*, by the Indians on the Columbia; and *N. nana*, by the Indians of the Rocky Mountains.

It is doubtful whether the use of T. as a narcotic was known in the East before the discovery of America. Meyen,

in his *Geography of Plants*, expresses the opinion that the smoking of T. is of great antiquity among the Chinese, because on very old sculptures he has 'observed the very same tobacco-pipes which are now in use.' Meyen's authority, however, is greater as a botanist than as an archeologist, and cannot be received as decisive of the antiquity of the sculptures of which he speaks. It is probable, but not certain, that the smoking of T. has been long practiced in China. On the introduction of the use of T. from America, it rapidly extended throughout Europe, and soon became extremely prevalent among oriental nations. The smoking of T. was found by Columbus a practice in the W. Indies, where the natives made it into cylindrical rolls, wrapped in maize-leaf. It has been prevalent from unknown antiquity among the American Indians as far n. as Canada. With them it even has a religious character, and is connected with their worship and with all their important transactions. Thus, the Calumet (q.v.), or pipe of peace, is indispensable to ratification of a treaty; and smoking together has greater significance of friendship than eating together has among other nations: also it seems to have served in the place of incense in their worship.

The seeds of the T. plant were brought to Europe first by Gonzalo Hernandez de Oviedo, who introduced it into Spain, where it was cultivated as an ornamental plant till Nicolo Menardes extolled it as possessed of medicinal virtues. It was introduced into Italy 1560. The use of T. in the form of snuff soon followed its introduction for smoking. There is no reference to the use of T. in Shakespeare; yet it was well known in England in his time, though at first its use was confined to the wealthy, as the price was very high; and it was smoked in very small pipes—probably those known to antiquaries as *Elfin Pipes*—and the smoke was expelled; not from the mouth, but by the nostrils, in which way the narcotic power of the herb is much greater. The popes Urban VIII. and Innocent XI. fulminated against it the thunders of the church; the priests and sultans of Turkey declared smoking a crime, Sultan Amuret IV. decreeing its punishment by the most cruel death; the pipes of smokers were thrust through their noses in Turkey; and in Russia, in the earlier part of the 17th c., the noses of smokers were cut off. King James I. of England issued a *Counterblaste to Tobacco*, in which he described its use as 'a custom loathsome to the eye, hateful to the nose, harmful to the brain, dangerous to the lungs, and in the black, stinking fume thereof nearest resembling the horrible Stygian smoke of the pit that is bottomless.' All opposition, however, was vain. The use of T. increased, and has increased to the present day, when it is more prevalent than at any former time—the luxury of rich and poor, of civilized nations and of savage tribes. Although it did not become prevalent in the East till the 17th c., the Turks and Persians are now the greatest smokers in the world; in India all classes and both sexes smoke; in China (as also in Japan) the practice is universal, and girls, from the age of eight or nine, wear, as an ap-

TOBACCO FIELD, SOUTHERN VIRGINIA.

pendage to their dress, a small silken pocket to hold tobacco and a pipe. The use of snuff has diminished. T is used in the three modes of smoking, chewing, and snuffing. Plugging, the stuffing of the nostrils with quids of T., has been almost universally discontinued. Chewing—still much practiced by sailors, to whom smoking is prohibited at sea, on account of the danger of fire—has greatly diminished among the refined classes. The smoking of T. is everywhere more or less social, like the use of wine; and the snuff-box in a former generation was handed from one to another in token of good-fellowship.

T. derives its botanical name (*Nicotiana*) from Jean Nicot, who introduced it into France. In that country its use in the form of snuff began in the reign of Francis II. About the same time, a snuff manufactory was established at Seville, which produced the celebrated Spanish snuff. The T. plant was soon introduced into other countries of Europe. In 1657 the manufacture and sale of T. were farmed out in Venice, and began to yield considerable revenue. Much revenue has since been derived from the same source in many countries. T. is now extensively cultivated in many parts of Europe, as well as in America and Asia. Prohibitory laws alone prevent its cultivation in southern parts of Britain and Ireland, where the climate is quite suitable. The quality of the leaf, however, deteriorates in the more northern regions, as in Germany, when it is continuously raised from home-grown seed; and seed is therefore imported from warmer countries.

Cultivation.—T. requires a rich soil, high manuring and careful cultivation. The quantity as well as the quality of the leaf is greatly modified by climate, soil, and manures; but there is such diversity of varieties that one suited to almost any section of the United States can be readily found.

Seed is sown in a hot-bed, or in a sheltered place in open land, from Feb. to Apr., according to latitude. If carefully tended, the plants will be ready to set from Apr. to June. The land for T. should be well plowed (some growers plow two or three times), thoroughly pulverized, heavily manured, and should also receive a liberal quantity of commercial fertilizers (see FERTILIZERS). Level cultivation is sometimes practiced, but the plants are often set on ridges. Rows are 2 to 4 ft. apart, and the plants 2 to 3 ft. apart in the rows—giving 5,000 to 8,000 plants per acre but only the smaller varieties can be set closely enough to secure the latter number. During growth of the crop, the ground must be frequently stirred and all weeds destroyed. The Cut-worm (q.v.) often proves very destructive, and makes it necessary to put out many new plants. Constant watchfulness is required to protect the leaves from the green-worm. Plants must be examined at frequent intervals, and all the worms which can be found, and the unhatched eggs on the under side of the leaves, destroyed. To increase the size of the leaves, prevent seeding, and hasten maturity, the tops of the stalks of those plants not designed for seed-growing should be broken off: this is

done as soon as the flower-buds are formed. By this process all leaves less than 6 in. in length are to be removed. Some growers break the tops lower than this, and remove also some of the leaves nearest the ground. When the shoots, called 'suckers,' which start from the axils of the higher leaves, reach a length of 3 or 4 in., they should be broken off close to the stalk, and it is necessary to repeat this operation just before the crop is harvested. As soon as the plants are mature, which will be indicated by a yellow or mottled appearance of the leaves, or before this time if there is danger of frost, they should be cut close to the ground: for this purpose, a saw, hatchet, or large knife is used. This work should not be done at midday if the weather is hot, nor when the leaves are wet; and the plants must not lie too long in the sun or be exposed to the rain. When the leaves are sufficiently wilted so that they will not readily break, the plants are to be strung on laths forced through the lower ends of the stalks by means of a sharp needle, about 6 or 8 plants to each stick, and taken to the tobacco-barn, where they can be hung upon poles to dry. While the curing process is going on, great care must be given to regulate the light and ventilation. In some places the curing is done in open sheds; in others it is hastened by hanging the plants in close buildings in which fires are maintained. A recently patented process consists in taking the leaves from the stalks in the field, stringing them on wires, and drying them by artificial heat. The field is gone over several times, the leaves that ripen earliest being taken first, and the others gathered as they mature. This is said to be much less costly than the ordinary method of curing, to prevent much of waste and damage, and to insure a better quality of leaf and a more uniform coloring than could otherwise be obtained. When the ordinary method of curing is followed, the plants are allowed to hang in the barn till late in the autumn, or till winter. During mild, damp weather, they are taken down; the leaves are 'stripped' from the stalks and packed into bales, boxes, or hogsheads. The work of assorting into various grades, done formerly by the grower, is now done usually by the buyer or manufacturer.—There are not less than 50 varieties of T. grown in the United States. Some are specially adapted to certain sections. Others which succeed over a wide range of soil and climate are valuable for certain specific purposes, as smoking and manufacturing into various forms for chewing, while widely different kinds are required to meet the demands of the various foreign countries to which considerable quantities are exported.

T. is imported largely in the leaf, though considerable quantities are brought in in various states of manufacture. The chief manufactured sort is called Cavendish, made by stripping the blades of the leaves from the midribs, and, after sprinkling them with an infusion of tobacco made from the stalks and other waste parts, laying them in heaps to heat or ferment. This darkens their color; and, while still moist and flaccid, they are laid smoothly on one

another, to form cakes about nine inches in length by three in breadth, which are pressed by powerful machinery until they are very compact. Another kind is called Negrohead, formed into sticks about an inch thick, and eight or nine inches in length, which are laid across each other equally, and are then pressed into cakes. When the sticks are pulled apart, the rounded depressions caused by pressing them into one another give them a slight resemblance to the wavy locks of a negro's hair, whence their name. Another kind is called Twist (or Pigtail); it is a continuous string of T. about the thickness of a quill, many yards in length, made by twisting and spinning the leaves when flaccid from being wetted and heated as above described: this string is then made into balls. This is the kind chiefly used for chewing. The leaf simply twisted into a rope, as in the kind called Varinas Roll and similar sorts, as well as that merely cut small for smoking, is all regarded as 'manufactured.'

Cigars and *Cheroots* also are forms of manufactured tobacco; but so much in favor are these with smokers that the exhorbitant duty is very little check on their demand. The island of Cuba supplies not only the best but also the largest quantity, the Havana T. being exceedingly well cultivated and cared for, and adapted especially for cigar-making. The Philippine Islands export about 100,000 lbs. per annum of cigars. Cigars and cheroots are essentially the same; they differ only in form—cheroots being rolled straight instead of spirally. Cheroots are chiefly from Manila.

Snuff is another form of manufactured T.: it is made by grinding the leaf either with or without the leaf-stalks and midribs. The grinding is generally effected in wooden mortars, with pestles also of wood; and some kinds of snuff are prepared from kiln-dried T., and others from the soft leaves. The varieties are numerous, and fortunes have been made by manufacturers who have been fortunate enough to make a snuff which has become a favorite. The first tobacco cultivated in the English colonies was grown in Jamestown, Va., in 1612; and it soon became the chief product of that settlement, being used as the medium of exchange. Its cultivation gradually spread through Virginia and Maryland, and from there to Kentucky and Tennessee. The first tobacco warehouse was established in Virginia in 1730; similar warehouses were established at Louisville, Ky. in 1839, and at Clarksville, Tenn. in 1845. Tobacco was grown in New England as early as 1650, but its cultivation was abandoned until the beginning of the 19th century. Since that time, it has been successfully grown in Connecticut; a warehouse was established at Warehouse Point, Conn. in 1825. The U. S. now annually produces more T. than all Europe combined, the average annual production of Europe being about 500,000,000 lbs. In 1905 there were 776,112 acres under cultivation in the U. S. producing 633,033,719 lbs. Kentucky was the leading state with 228,975,240 lbs.; Virginia third with 79,971,

725 lbs. The first cigar manufactories were established in Connecticut in 1810. Within the past few years the tobacco manufacturing industry has been revolutionized by the use of machinery; the census for 1900 reported 15,252 establishments with a capital of $124,089,871.

Tobacco is used as a sedative or narcotic over a larger area and among a greater number of people than any similar substance, opium being second, and the hemp-plant third. T.-leaves, when submitted to chemical analysis, yield Nicotine (q.v.), the most characteristic constituent of T., albumen, a gluten-like substance, gum, resin, malic and citric acids, and a large amount of inorganic constituents, 100 parts of the dry leaf yielding from about 19 to 27 per cent. of ash, in which potash, lime, and silica preponderate. In a physiological and medical view, the analysis of the smoke of T. is far more important than that of the leaf. From the researches of Dr. Benjamin W. Richardson, it appears that, though 'the widest differences prevail in respect to the products arising from differing cigars, differing kinds of tobacco, and differing pipes,' there are certain substances which are common to all varieties of tobacco-smoke. First, there is in all T.-smoke a certain amount of *watery vapor*, impregnated with various substances, from which it may be separated.' Secondly, a small quantity of free *carbon* is always present; it is to the presence of this constituent that the blue color of the smoke is due. 'It is this carbon,' says Dr. Richardson, 'which in confirmed and inveterate smokers settles on the back part of the throat and on the lining membrane of the bronchial tubes, creating often a copious secretion, which it discolors, and which is coughed up of a dark coaly appearance.'—*For and Againt Tobacco*, Lond. 1865, p. 5. Thirdly, there is a certain quantity of *ammonia* present. The ammonia gives to the smoke an alkaline reaction, bites the tongue, and makes the tongue and throat dry after much smoking. Fourthly *carbonic acid* is always present, as may be shown by its action on lime-water. The amount differs extremely in the smoke from different kinds of T.; but, according to Dr. Richardson, it may be inferred that the sleepiness, headache, and lassitude which follow prolonged inhalation of T.-fumes are due largely to the carbonic acid. Fifthly, T.-smoke yields a *product having an oily appearance* and possessing poisonous properties. It is popularly known as *oil of tobacco*, and on further analysis it is found to contain three substances—a fluid alkaloid, *nicotine;* a *volatile substance* having an empyreumatic odor; and a dark resinous *extract* of bitter taste. The symptoms of tremor, palpitation, and paralysis which ensue after excessive smoking, especially in persons unaccustomed to the practice, seem to depend on the nicotine, which is known, by experiment, to be highly poisonous. The peculiar smell of stale tobbaco-smoke, on the smoker's breadth and clothing, is from the volatile empyreumatic substance; and the nauseous sharp taste when the unpracticed smoker takes a foul pipe into his mouth is due to the bitter extract. It is apparently this extract which creates

vomiting in persons unaccustomed to tobacco, and of which the body after a time becomes tolerant. Hence it appears that the more common effects are due to the carbonic acid and the ammonia; while the rare and more severe are due to the nicotine, the empyreumatic substance, and the resin.

The poisonous effects which large doses of T. produce in persons unaccustomed to its use—in the form of powder, infusion, or excessive smoking—are faintness, nausea, vomiting, giddiness, delirium, loss of power of the limbs, general relaxation of the muscular system, trembling, complete prostration of strength, coldness of the surface, with cold, clammy perspiration, convulsive movements, paralysis, and death. In some cases there is purging, with violent pain in the abdomen; in others there is rather a sense of sinking or depression in the region of the heart. With these symptoms there is dilatation of the pupils, dimness of the sight, small, weak, and scarcely perceptible pulse, and difficulty of breathing. In all cases of poisoning with T., if it has been swallowed, an emetic of a scruple of sulphate of zinc should be at once administered, and the most powerful stimulants, external and internal, should be employed. Prof. Haughton has shown that nicotine and strychnine antagonize each other; on this assumption, strychnine, carefully administered, would be the proper antidote.

The cases are not very uncommon of slightly unpleasant results from the use of T.; but fortunately the effects produced by T. are very transitory, as the injurious elements find ready exit from the body. The system, after being subjected a few times to the influence of tobacco-smoke, becomes accustomed to it, the distressing symptoms no longer occur, and a condition of 'tolerance' is established. From the extensive investigations of Dr. Richardson, it appears that there are no grounds for believing that smoking can produce any organic changes. But it may produce various functional disturbances: (*a*) On the stomach. (*b*) On the heart, producing debility and irregular action. (*c*) On the organs of the senses, e.g., dilatation of the pupil, confusion of vision, subjective sounds, etc. (*d*) On the brain, suspending the waste of that organ, and oppressing it if it be duly nourished, but soothing it if it be exhausted. (*e*) On the nerves, leading to oversecretion of the glands which they control. (*f*) On the mucous membrane of the mouth, causing in excessive smokers what has been described as 'smoker's sore throat.' 'The disease consists of an irritable state of the mucous membrane at the back of the throat, redness there, dryness, a tendency to cough, and an enlarged, soft, sore condition of the tonsils, rendering every act of swallowing painful and difficult.' It may exist long without detection; but if a damp, cold, foggy state of the air comes on, the throat becomes troublesome and painful, enlargement of the tonsils is detected, and the symptoms are aggravated by an attempt to smoke. This condition is induced more readily by the use of cigars than of pipes; it is quite incurable so long as the patient continues to smoke, but soon disappears when

the use of T. is entirely suspended. In association with this condition of the throat, the gums are usually abnormally pale and firm. (*g*) On the bronchial surface of the lungs, sustaining any irritation that may be present, and increasing the cough. There is no evidence that T.-smoke can cause specific diseases, such as insanity, epilepsy, St. Vitus's dance, apoplexy, organic disease of the heart, cancer, consumption, or chronic bronchitis. If, as is universally allowed, T. possesses, as do alcohol, arsenic (in minute doses), opium, tea, coffee, etc., the power of arresting the oxidation of the living tissues, and thus checking their disintegration, it follows (1) that the habit of smoking must be 'most deleterious to the young, causing in them impairment of growth, premature manhood, and physical degradation' (Richardson, *For and Against Tobacco*, 73); and (2) that the habit may be conducive to the physical well-being of the individual, in the lack of sufficient nourishment from food to supply the daily wear and tear of the muscular and nervous systems.

For a long controversy on the question, *Is Smoking Injurious to Health?* in which distinguished medical men took part, see *The Lancet*, 1857, I. Some reformers violently antagonize smoking as the fruitful root of numberless moral and physical evils. The whole matter is fairly summed up by Dr. Richardson in the pamphlet freely used in this article. Before the full maturity of the system is attained, even the smallest amount of smoking is of ruinous effect; subsequently the habit is, in most instances, prejudicial only when carried to excess. The difficulty is to define moderation and excess. It should be noted, however, that there certainly are individuals, and probably in large number, to whom throughout life any use of T. would be injurious. We cannot honestly say more on the score of health against T. than can be urged against tea or any other luxury; and of nearly every luxury it is the least injurious. 'It is innocuous as compared with alcohol; it does infinitely less harm than opium; it is in no sense worse than tea; and by the side of high living altogether, it contrasts most favorably.'—Richardson. Dr. E. A Parkes says, 'From moderate use I can see no harm;' and Sir Robert Christison concludes that 'the smoke has an extraordinary power in removing exhaustion, listlessness, and restlessness, especially when brought on by bodily or mental fatigue.'—A long, perfectly clean pipe, of an absorbing material like clay or meerschaum, which can suck up the oily matter before it reaches the mouth, is to be preferred; and it has been suggested that if a plug of cotton, saturated with a strong solution of citric or tannic acid, were placed in the stem, to filter the smoke, all the nicotine would be seized by and combine with the acid. The different kinds of T. exert a different influence according to the amount of their noxious ingredients. Thus, Cavendish, Pigtail, and coarse Shag yield the oily matters in much more abundance than Latakia or Turkish; hence the last two are termed mild tobaccos. Cigars tend more than pipes to produce dyspepsia; for in smoking them,

unless with a long mouth-piece, nicotine is absorbed. Snuffing has been deemed the least injurious form of the use of tobacco, and chewing the most deleterious; yet sailors, who chew more freely than almost any other class, usually have vigorous health, and after long habit they can consume an almost incredible quantity: see *The Lancet*, 1847, I., 440.

Tobacco has been used in medicine in the form of an enema, for relaxing the muscular fibres, in strangulated hernia, stricture of the bowel or urethra, tetanus, etc.; but in such cases it has now been superseded by chloroform. If it continue to hold a place in the Pharmacopœia, it will probably be as an antidote to strychnine.

Indian Tobacco (*Lobelia inflata*) has nothing in common with tobacco, (see LOBELIA).

Tobacco Industry.—Census statistics of the manufacture of tobacco appeared first at the census of 1810. The classifications were 'American segars.' 'Spanish segars' and 'tobacco and snuff.' No totals were presented for the entire country, but the returns for Pennsylvania gave a total of 3,898,999 Spanish segars, valued at $26,550; 29,061,000 American segars, valued at $44,253; and 2,186,757 pounds of tobacco and snuff, having a value of $410,910. For Virginia were returned 2,726,713 pounds of tobacco and snuff, of a value of $469,000. At the census of 1840, out of 30 states and territories the manufacture of tobacco was reported for 28, the total value of products as shown in the recapitulation being $5,819,568, of which Virginia reported $2,406,671.

Growth Since 1850.—The returns at the census of 1850 were for 'tobacconists;' the value of products was reported as $13,491,147, of which $5,157,652 was from Virginia; the number of establishments in the United States was 1,418; the capital, $5,008,295; the number of wage-earners, 14,236, of which 1,975 were females; the cost of labor, $2,420,208, and of materials $7,341,728.

The enormous growth of the industry since 1850 is indicated by the fact that the value of products, for the year covered by the census of 1905, was $331,117,681, the capital employed being $323,983,501. In the same year the industry expended $126,088,608 for materials; $62,640,303 for wages; $8,800,434 for salaries; and $80,145,016 for miscellaneous expenses. The value of products increased 25.6 per cent for 1905, as compared with 1900; the cost of materials, 35.8 per cent; and the amount paid in wages, 30.6 per cent. The reported capital shows an increase of 190.5 per cent. This disproportionate increase in capital is very striking. The increase, it seems, was mostly confined to the item, cash and sundries, and may be due in part to some differences in the method of reporting this item at the two censuses. But the figures seem to indicate that for some reason a very large and exceptional amount of capital was em-

ployed in this industry in the year covered by the census of 1905 as compared with conditions five years before.

The number of wage-earners employed in 1905 in this industry was 159,408; this represents the average number employed during the year and includes 85,691 men, 66,301 women, and 7,416 children under 16 years of age. The proportion of women comprised in the total has greatly increased in recent years. In 1880 only 23.1 per cent of the total number of wage-earners in this industry were women. This proportion increased to 29.8 per cent in 1890, 37.2 per cent in 1900, and 41.6 per cent in 1905.

The Two Main Branches of the Industry.—Of the reported aggregate value of products, cigars and cigarettes form 64.7 per cent and chewing and smoking tobacco and snuff 35.3 per cent. Of the total number of wage-earners, 85 per cent were employed in the manufacture of cigars and cigarettes. The number of establishments reported as engaged in the manufacture of cigars and cigarettes was 16,395, while the number reported for the other branch of the industry was only 433. This striking difference is due in part to the fact that cigars and cigarettes are to a considerable extent manufactured in small establishments, whereas chewing and smoking tobacco and snuff is mostly produced in factories of considerable size. For the cigar and cigarette branch of the industry the average capital invested per establishment was only $8,852, while for the other branch it was $413,043. A similar contrast appears in the average number of wage-earners per establishment, the number being 8 for cigars and cigarettes and 55 for chewing and smoking tobacco and snuff.

Tobacco Consumed.—According to the reports of the commissioner of internal revenue the total amount of tobacco manufactured in 1904 was 448,511,583 pounds, the quantity used in the manufacture of cigars and cigarettes being 141,020-029 pounds, as compared with 307,491,554 pounds used for the production of chewing and smoking tobacco and snuff. As reported by the Census the value of the raw materials—mostly tobacco—used in the manufacture of cigars and cigarettes ($69,-291,011) was more than twice the value of that consumed in the other branch of the industry ($31,347,252).

According to figures derived from the reports of the commissioner of internal revenue, the number of cigars manufactured in the calendar year 1904 was 7,376,669,-742 and the number of cigarettes was 3,433,993,422. As compared with the year 1900 this shows an increase of 19.4 per cent in the manufacture of cigars and of 5.4 per cent in the manufacture of cigarettes. The census bulletin calls attention to the fact that the number of cigars and cigarettes consumed increased 27.5 per cent between 1900 and 1905; and that between 1869 and 1905 the consumption of cigars increased nearly sevenfold,

while the population in the same period increased only a little over twofold.

Principal Producing States.—The manufacture of cigars and cigarettes is one of the few factory industries that are represented in every state and territory. The production ranges in value from $9,310, reported for the state of Mississippi, to $60,623,617, reported for New York. The production in New York represents in value 28.3 per cent of the total production ($214,350,051) of the United States. There were four other states for which the reported value of products exceeded $10,000,000. These states, with the value of product, were as follows: Pennsylvania, $39,079,122; Florida, $16,764,276; Ohio, $13,241,230; and Illinois, $11,669,485. As compared with the census of 1900 a very noteworthy increase in the value of product is shown for the state of New Jersey, in which the production increased from $2,647,595 for 1900 to $8,331,611 in 1905. This increase was due chiefly to the establishment of a number of large cigar factories, most of which were owned by one corporation. As a result, New Jersey advanced from the twelfth place in 1900 to the sixth at the census of 1905.

The production of chewing and smoking tobacco and snuff is confined to a smaller number of states than that of cigars and cigarettes. The total production reported for the United States is $116,767,630. Of this total, $27,836,422 was reported for the state of Missouri and $25,488,721 for the state of North Carolina, these being the two leading states and producing together 45.7 per cent of the total product. The only other states reporting a product in excess of $5,000,000 were Kentucky ($13,117,000), Virginia ($10,662,268), Ohio ($7,247,292), and Maryland ($7,054,159).

Exports and Imports.—It would appear from the figures presented in this bulletin that the manufactures of tobacco in this country are principally for domestic consumption. This is particularly true as regards cigars. The value of the annual product of cigars in the United States as reported at the census of 1905 was $198,186,372, while the total value of cigars exported during the fiscal year 1905 was only $59,653. The exports of cigarettes assumed somewhat greater importance. The total value of the cigarettes produced in the United States was $16,354,803 and the value of the exports was $2,934,376. The value of cigars, cigarettes, and cheroots imported in 1905 was $4,028,107.

Bibliography.—Cooke, *Tobacco* (1860); Fevre, *Le Tabac* (1863); Guys, *Culture of Latakia Tobacco* (1863); Maling, *Tobacco Trade and Cultivation of the District of Cavalla* (1863); Saxton, *Handbook of Tobacco Culture* (1863); de Coin, *History and Cultivation of Cotton and Tobacco* (1864); Dunning, *Tobacco* (1876); Killebrew, *Tobacco in Tennessee* (1876); Bur-

ton, *Cultivation of Tobacco* (1877); Senseney, *Tobacco from the Seed to the Warehouse* (1878); Gilmore, *History of Tobacco* (1878); Ragland, *Tobacco from the Seed to the Salesroom* (1880); Killebrew, *Report on the Culture and Curing of Tobacco, United States Census* (1883); Meyer, *Havana Cigars* (1885); Taylor, *Tobacco* (1886); Lock, *Tobacco* (1886); Beale, *English Tobacco Culture* (1887); Killebrew and Myrick, *Tobacco Leaf* (1897); Davis, *Tobacco Culture, North Carolina.*

TOBACCO-PIPES: pipes of various materials used in the smoking of tobacco, the commonest being of a fine white clay, which has received the name *pipe-clay.* The first part of the manufacture is performed by trained children, who, with nice touch, roll out on a board a small piece of clay into a long slender cylindrical rod, at the end of which is then attached a lump of clay, just enough to form the bowl. These rudimentary pipes are arranged by dozens on a board, until they have become sufficiently hardened. The pipe-maker then takes a pointed iron wire, and, first dipping it into oil, pushes it into the end of the thin column of clay, and, having passed it through, forms the bowl with a folding brass mold. The wire is then withdrawn; and after a slight dressing with a knife, the pipes are slightly curved in the stem, and are laid aside to dry for a few days, when they are removed to a peculiar kiln whose interior chamber is only a *seggar* on a large scale, such as is used in making Pottery (q.v.). When thoroughly baked, the pipes undergo a kind of polishing or dressing, and are ready for sale. More expensive pipes are made of Meerschaum (q.v.): for various materials used for the tubes of these and other pipe-bowls, see PIPE-STICKS. *Brier-root pipes* have the bowl and stem of one piece of wood; and, though the stem is short, they partially absorb the oil produced in smoking, which, however, is perhaps as much the case with the common clay-pipe when new.

It is believed that pipes for smoking herbs for medicinal and other purposes were in use in England and elsewhere long before the introduction of tobacco. Colt's-foot, yarrow, mouse-ear, lettuce, and other plants are occasionally smoked, and no doubt have been so for centuries. A primitive pipe, still in use in some rural districts, consists of a stick of elder from which the pith has been removed, with a bowl formed of common clay and dried by the kitchen-fire. Pipes have been found near the Roman wall in Northumberland, and other Roman stations in Britain, suggesting at first the notion, now discarded, that they were used by the Roman soldiers. Many of these ancient pipes are remarkable for very small size, due probably to the high price of tobacco when introduced into Europe, and to the custom of inhaling the smoke by

the mouth and expelling it through the nostrils, thus gaining the utmost narcotic effect. Similar very small pipes have been found in N. America, and the same mode of smoking has always prevailed among the Amer. Indians. See Wilson's *Prehistoric Man*, II. Stone-pipes, or pipe-bowls, have been found in Britain, cut in rude forms, and apparently used by the insertion of a tube, perhaps a straw. Such pipe-bowls, but elaborately carved, are among the most remarkable American antiquities, and are still made by the Amer. Indians, often of very hard stones adorned with figures of men and animals. Some are adapted for two tubes, for two smokers at once. Among some of the Amer. tribes, great care is bestowed on ornamenting the pipe-stem; by others, on the bowl.

The clay-pipe, much the same as now used, probably came into use in Europe very soon after the introduction of tobacco. Aubrey, 1680, says that tobacco-smokers in England at first used silver pipes, 'but the ordinary sort made use of a walnut-shell and a straw.' In the reign of William III., pipes were occasionally of brass and iron. The pipe was, in earlier days, passed round the table—one man taking a whiff or two, and then handing it to his neighbor. The criterion of age is the *form*. The barrel-shaped bowl was most usual during the commonwealth and the reign of Charles II., though it was in many various shapes. In the reign of William III., a more elongated form of bowl became prevalent, introduced probably from Holland, though the barrel-shaped bowl still was used. In the middle of the 18th c., the wide-mouthed bowl, now nearly universal, became prevalent, and the spur, previously flat, to rest the pipe upon when in use, was elongated, after a fashion supposed also to have originated in Holland. The Scottish *cutty-pipe* and Irish *dudeen* are short clay-pipes.

The pipe-makers of London, as early as 1601, had privileges which gave them a monopoly. Holland has long been famous for pipe-making. The Dutch manufacturers were very jealous of rivalry. In the middle of the 18th c., a pipe manufactory was established in Flanders, and the Dutch makers determined to ruin it. The duties were too high to admit large importation; therefore they freighted a large ship entirely with tobacco-pipes, set sail to Ostend, and purposely wrecked her there. In accordance with the maritime laws of that city, the pipes were landed from the wreck, and sold at such 'ruinous prices' as defied competition; and the new manufactory was immediately closed.

TOBAGO, *tō-bā'gō:* island, most southerly of the W. India Windward Islands (see ANTILLES), belonging to Britain; 60 m. s.e. of Grenada, 20 m. n.e. of Trinidad; 26 m. long, 7½ m. in greatest width; 114 sq. m. The island was discovered by Columbus 1498, and named by him Assumption; the name of T. is supposed to have arisen from the free use of tobacco by the Caribs when first visited by Europeans. Claimed by the Brit., then occupied by the Dutch and the French, it was finally ceded to Britain 1814. From its gloomy-looking mountains, dense forests, and

abrupt precipices, descending to the sea, T. has been called the 'Melancholy Isle;' but, on nearer approach, the aspect becomes more pleasing, though still rough and irregular, being extensively occupied with conical hills and spurs, all connected by a ridge through the interior, whose greatest elevation is 1,800 ft. above sea-level. From the high ridge descend deep and narrow ravines, which terminate in small alluvial plains. Scarborough (pop. 1,200) is its cap., pleasantly situated on the shores of Rochley Bay. Plymouth, opposite Scarborough, is the landing-place for passengers, etc., from the royal mail-steamers. Two-thirds of the island is still covered with primitive forests, comprising many varieties of hard-woods and ornamental trees. The geological formation is similar to that of Trinidad. The climate is considered salubrious; the thermometer ranges from 75° to 90°. The cultivation of cotton and tobacco has been recently introduced in the island; other products of importance are sugar, rum, molasses, cocoanuts, cotton, coffee, and indigo; pimento also grows wild. T. was annexed to Trinidad in 1889, and became a ward of the main island 1899. The people are mostly of African race. Pop. (1901) 18,750.

TOBERMO'RY: see MULL, ISLAND OF.

TOBINE, n. *tō'bĭn* [Ger. *tobin;* Dut. *tabijn* (see TABBY)]: a stout twilled silk.

TOBIT, *tŏ'bĭt*, BOOK OF: one of the most curious and interesting of the Old Test. apocryphal books. It exists at present in Greek, Latin, Syriac, and Hebrew MSS., whose texts differ considerably, yet not materially. The oldest and most valuable is the Greek Septuagint; indeed, where the others depart from it, they possess little claim to respect. Since the argument of Nöldeke (*Monatsb. Berl. Ak.*, 1879, p. 45), the Greek text has been conjectured to be the *original*. It is not known when and where the book was written: Ewald selects Persia as the scene, and the middle of B.C. 4th c. as the date of its composition; the author he imagines to have been a Palestinian Jew who wrote in Hebrew, and conjectures that a translation of the work was made into Alexandrian Greek B.C. 1st c. But if the Greek text be the original, it can scarcely be referred to a date earlier than B.C. 2d c.; and Robertson Smith ascribes the authorship to a Jew of the eastern dispersion, writing perhaps in Egypt, but incorporating Persian elements in his story. That the contents of T. are not historical, is evident: yet till the period of the Reformation it was commonly received as such. The leading incidents resemble in grotesque *miraculousness* the fantastic tales of the Arabian Nights. Tobit, sleeping outside the wall of his court-yard one night, is blinded by sparrows 'muting warm dung into his eyes;' his son Tobias is attacked while washing his feet in the Tigris, by a fish, which he kills, and under instruction from the angel Raphael secures from its liver and gall powerful drugs. The son then

marries a Jewish maiden, Sara, seven of whose betrothed lovers had been successively carried off by an evil spirit, Asmodeus. Asmodeus is driven off by use of one of the drugs and with help of the angel, and then flies to the uttermost parts of Egypt, where he is bound. Old Tobit is cured of blindness by an application to his eyes of the other drug from the fish. Though the narrative is thus childishly absurd, the sentiments are often pious and didactic; the descriptions of social life are picturesque and apparently true.—For the place which this book holds in ecclesiastical use, see APOCRYPHA.

TOBOGGAN, n. *tō ŏŏg'găn:* sled made of a couple of thin planks fastened together, turned up in front, and shod with runners, originally used by the Indians of Lower Canada for carrying burdens over snow, but now extensively used in the sport of coasting or sliding down long slopes of frozen snow at great speed: V. to slide on a toboggan. TOBOG'GANING, n. *-gan-ĭng*, the exciting and favorite winter amusement of the Canadians with the toboggan *Note.*—The word *Toboggan* is said to be a corruption of Am. Indian *odabagen*, a sled. The form *tobaaken* (a sled) has been found by Skeat in an old English Micmac dictionary.

TOBOLSK, *tō-bŏlsk':* government in the n.w. angle of Siberia; bounded n. by the Arctic Ocean, w. by the Ural Mountains, e. by the govts. of Yeniseisk and Tomsk; 531,980 sq. m.—nearly one-fourteenth of the whole Russian empire. Branches of the Ural and Altai Mountains form a hilly region in the w. and s.e.; but the govt. is largely a vast plain, sloping to the banks of the principal rivers and to the shores of the Arctic Ocean. The chief rivers are the Ob (q v.) and its great navigable affluents, the Irtish, Tobol, Om, and Toura. The soil is fertile in s. and middle districts; marshes covered with forests occupy the land n. of lat. 57°, and frozen marshes border the Arctic Ocean: see TUNDRA. The climate has great extremes; it is mild in the middle districts, very severe in the n., and warm in the s. Dogs, martens, ermines, silver and blue foxes, bears, deer, etc., eider-ducks, geese, ducks, etc., are principal animals. The chief crops are rye, oats, and barley. Agriculture employs the great mass of the inhabitants, except in the n., where hunting and fishing are general occupations. The luxuriant meadows of the south are taken advantage of for cattle-breeding. Timber, furs, and fish are chief articles of commerce. The people are mostly Russians; but there are also Ostiaks, Tartars, Bokharians, and Samoiedes.—Pop. 1,500,000.

TOBOLSK': town of w. Siberia, cap. of the govt. of T.; at the confluence of the Irtish and the Tobol; 1,976 m. e. of St. Petersburg, 1,535 m. from Moscow. It is well built, with timber houses and wide and regular streets, and its position on the two great rivers is picturesque; but its lower part is subject to almost annual inundation from the floods of the Irtish in spring. Its situation, considerably n. of the great commercial highway between Russia and Siberia, and distant from the more productive regions of

the country, is unfavorable for commerce. T. contains a large prison, capable of accommodating 3,000 prisoners; and the convicts condemned to exile in Siberia are assembled at this town, and thence deported to various parts of the country. Several regiments are stationed here.—Pop. 21,336.

TOCANTINS, *tō-kân-tēnz′:* important river of Brazil, rising in the province of Gojas, flowing n. through the province of Para, and joining the Para (q.v.), the s. branch of the estuary of the Amazon, 130 m. from the Atlantic. Its principal affluent is the Araguay, which joins it in lat. 6° s., and has a longer course, with greater volume of water than the T. The T. at its junction with the Aragnay is 5,500 ft. wide; at its mouth it is 8 m. wide: total length, 1,100 m. Boats descend from Porto Imperial (lat. 10° 30′ s.) to the mouth of the T. in 20 to 30 days.

TOCHER, n. *tŏk′ėr*, but in Scotch the *clo* is guttural [Gael. *tochar*, a marriage portion]: in *Scot.*, a marriage portion given by a father on the marriage of his daughter (see MARRIAGE); a dowry; V. to give a dowry to. TOCH′ERING. imp. TOCHERED, pp. *tŏk′ėrd.* TOCH′ERLESS, a. having no marriage portion.

TOCQUEVILLE, *tŏk′vĭl* or *tok-vēl′*; ALEXIS HENRI CHARLES CLEREL, Comte DE: French statesman, in the first rank of writers in the 19th c. on the science of politics: 1805, July 29—1859, Apr. 16; b. Verneuil, dept. of Seine-et-Oise. His father was the representative of an old family, the Clerels, proprietors of Tocqueville in Normandy: his mother was granddaughter of Malesherbes, academician, political writer, and magistrate, who defended Louis XVI. at the bar of the convention, and whose intrepidity was punished by the beheading of himself and all the most distinguished of his relations. Madame de T. and her husband narrowly escaped the guillotine by the fall of Robespierre; but they did not emigrate, like other royalist families, and they preserved their property. At the restoration 1815, the father of De T. reassumed the title Count. De T. was called to the bar at Paris 1825; and, after a short tour in Italy, entered the magistracy as *jugo auditeur* at Versailles. In this situation he carefully studied the administrative system of France; and, struck by the perpetual recurrence of revolution, gave much thought to political questions. In 1831 he resigned his appointment at Versailles, and with his colleague there, Gustave de Beaumont, accepted a govt. mission to the United States, to report on the petitentiary system. The commissioners, after their return to Europe, published their report (*Du Système pënitentiaire aux Etats-Unis*, 1832; Eng. transl., Philadelphia 1833)—an admirable work, which modified French ideas of prison-discipline. But a more important result appeared 1835, when De T. published his great work, *De la Dèmocratie en Amérique*

(Eng. transl. by Reeve, London 1835). In his introduction, he sought to show that a great democratic revolution has for centuries been going on in Europe. There is a general progress toward social equality, which must be regarded as a providential fact. In France it has always been borne on by chance, the intelligent and moral classes of the nation never having connected themselves with it, in order to hold and guide it. In the United States he found that the same revolution has been going on more rapidly than in Europe, and has indeed nearly reached its result in the absolute equality of conditions. There, accordingly, he thinks is shown what is about to result in Europe. He points out that the people in the United States may be strictly said to govern: they make the laws and they administer them. He draws from what he has observed the conclusion that democracy may be reconciled with respect for property, deference for rights, safety to freedom, and reverence for religion. He does not propose the laws and manners of the United States for other democratic peoples. He merely seeks, by a faithful picture of an existing democracy, to allay the dread of democratic progress, and to induce those at the head of affairs to recognize it as irresistible, and to seek to control it by wise concessions. *The Democracy* made at once an immense sensation. The accuracy of the statements, the skill with which the matter had been digested, and the beauty of the style, were praised by critics. The author was hailed as the continuator of Montesquieu, and the greatest political writer of his time. He became successively a member of the Acad. of Moral Sciences and of the French Acad. In 1835 De Tocqueville visited England, where his work had made him known, and where he received enthusiastic welcome from the leaders of the whig party. In the same year he married Miss Mottley, an English-woman. He shortly afterward, by a family arrangement, entered into possession of Tocqueville. He stood, 1837, as candidate for the representation of Valognes in the chamber of deputies. His opponent was a retired mill-spinner, who raised the cry of 'No nobles' against him. De Tocqueville was defeated; but two years later he had become a great favorite with his neighbors, the Norman farmers, and they returned him to the chambers by an overwhelming majority. As a speaker, De Tocqueville had no gifts, but he exercised great influence on the legislature. Immediately after the Revolution, he was the most formidable opponent of the socialists and extreme republicans. He opposed Louis Napoleon, as a man who believed in his right to the throne as firmly as Charles X. De Tocqueville became, however, 1849, vice-pres. of the assembly; and, June to Oct. in the same year, minister of foreign affairs. At this time he vindicated the policy of the expedition to Rome, on the ground, it must not be forgotten, that it would secure liberal institutions to the States of the Church. After the *coup d'état*, he returned to Tocqueville, where he engaged in agricultural pur-

suits. He there wrote *L'ancien Régime et la Révolution* (Par. 1856; Eng. transl., London and New York 1856), a work worthy of his fame. In 1858, June, he broke a blood-vessel, and left the bleak coast of Normandy for a warmer climate, at Cannes, where he died. Tocqueville's *Œuvres et Correspondance Inédites* were pub., 2 vols. (1860), by his friend De Beaumont, who prefixed a biographical notice (Eng. transl., London and New York 1861).—De Tocqueville was the first to present a systematic philosophical discussion of the political institutions of the United States. His great work shows rare insight, unbiased judgment, clear vision of fundamental principles, and a profound tracing of them in their systematic and orderly development in political institutions.

TOCSIN, n. *tŏk'sĭn* [F. *tocsin*—from OF. *toquer,* to touch, to strike, and *sing,* a sign, a bell (see TOUCH and SIGN)]: an alarm-bell; a signal given by the ringing of a bell.

TOD, n. *tŏd* [Icel. *toddi,* a flock or ball of wool: Ger. *zote,* a lock or flock of wool: Dan. *tot,* a bunch of flax]: a bunch of anything fibrous, as hay; an old weight of wool of 28 lbs.; in *Scot.,* the fox—probably so called from its bushy tail; in *OE.,* a bush; a thick shrub: V. in *OE.,* to yield in weight.

TODARS, *tō'dėrz,* or TODAWARS, *tō'da-wėrz,* or THODAS, *thō'daz,* or TUDAS, *tū'daz:* remarkable pastoral race inhabiting the upper part of the Neilgherry Hills (q.v.), in s. Hindustan, claiming to be the aborigines of the whole hill country. See INDIA—*Inhabitants.* They are rapidly diminishing in number, chiefly through the practice of Polyandry (q.v.) and their not allowing intermixture with other races; in 1881 they numbered 675. They are of dull copper color, tall, well proportioned, and athletic, with finely molded limbs and bold, independent carriage; the nose aquiline, with black, bushy hair and beard. The dress of the men consists of a single toga, worn so as to leave the right arm free, not unlike the plaid of the Scottish highlander. The Todars are indolent and dirty. The buffalo is their great dependence; they attempt no culture of land, obtaining what grain they require from the agricultural tribes, who pay it in the shape of tribute (*goodoo*) (though often rather as a kindness) for their lands, over which the Todars assert an imaginary right. The only use the Todars get of their buffaloes, besides their milk, is to furnish sacrifices to the manes of the dead. They are wont to salute the sun at his rising and setting, and believe that the soul after death goes to the 'great country.' They worship only 'ideal' gods, without images. They have never been known to steal. Their language is of the Dravidian stock; it has no written character. They are strangely allowed to collect their tribute of grain, by which they are supported in idleness and plenty.—See *Statistical*

Memoir of a Survey of the Neilgherry Mountains (1861); Harkness's *Description of a Singular Aboriginal Race* (1832); Burton's *Goa and the Blue Mountains* (1861); Tyler in *Nature* (1873).

TO-DAY, n. ad. *tû-dā'*. See under To.

TODD, *tŏd*, ALPHEUS: Canadian librarian: b. England 1821; d. 1884. He came to Canada in 1833 and entered the public service; became assistant librarian of the Canadas 1840, librarian 1856, and librarian of parliament at Ottawa 1867. His works upon constitutional law and parliamentary practice are recognized as standard authorities, and include: *The Practice and Privileges of the Two Houses of Parliament* (1839); *Treatise on Parliamentary Government in England: Its Origin* (1867-9); *Development and Practical Operation* (2 vols.); *Parliamentary Government in the British Colonies* (1880); etc.

TODD, JOHN, D.D.: author and Congl. minister: 1800, Oct. 9—1873, Aug. 24; b. Pittsfield, Mass. He graduated at Yale 1822; kept a school one year; studied theology at Andover, and was ordained minister 1827. He held Congl. pastorates successively at Northampton, Mass. (1833), Philadelphia (1836), First Church, Pittsfield, Mass. (1842-72, when he retired on account of age). He had a part in founding Mt. Holyoke Female Sem. He was author of nearly 30 vols., and some of his writings had an enormous circulation: many were translated into various languages—German, French, modern Greek, Dutch, Danish, Italian, Arabic, Armenian, Turkish, and Tamil. He won great distinction also as preacher and lecturer, and was a frequent contributor to religious periodicals. Among his most successful didactic works were: *Lectures to Children; Student's Manual; Hints to Young Men; Hints and Thoughts for Christians.*

TODD, THOMAS: jurist: 1765, Jan. 23—1826, Feb. 7; b. King and Queen co., Va. He served as a soldier from Va. during the latter part of the revolution; afterward removed to Ky., studied law, and became clerk of the district court, and later of the court of appeals; 1801-06 was judge of the court of appeals; 1806-7 chief-justice of Kentucky; and from 1807, Mar. 3, until his death, associate justice of the U. S. supreme court. He died at Frankfort.

TODDLE, v. *tŏd'dl* [O. Dut. *touteren*, to tremble, to see-saw: Ger. *zotteln*, to reel, to stagger (see TOT 1)]: to walk unsteadily, or with short tottering steps, as a child: N. *familiarly*, a walk or saunter. TOD'DLING, imp. *-dlĭng*. TODDLED, pp. *tŏd'dld*.

TODDY, n. *tŏd'dĭ* [Hind. *tari*, *tadi*, the juice of the Palmyra tree; *tar*, a palm-tree, the sound of the *r* in the Hind. word is represented by *d* in Eng.]: the juice or sap drawn from various kinds of palms in the East Indies; a spirit or liquor prepared from it; a mixture of spirits and hot water sweetened; punch: *grog* is a mix-

ture of spirits and cold water (see SPIRIT). TODDY-LADLE, a small ladle or deep spoon for mixing toddy in the tumbler or bowl, and for lifting a portion of it into a wine-glass.

TODDY BIRD: a swallow-shrike (*Artamus fuscus*) of India and Ceylon. It is about 7 inches long, of dusky plumage, and is most abundant in wooded districts, especially where palm trees abound, more particularly the Palmyra or toddy palm, from which it takes several of its popular names.

TODDY CAT: one of the civets (*Paradoxurus typus*), common throughout the greater part of India, Ceylon, Burma, and the Malayan region, which dwells mainly in the Palmyra or toddy palm-groves. See TODDY.

TOD'HUNTER, ISAAC: English mathematician: b. Rye 1820; d. Cambridge 1884, Mar. 1. He was graduated from London University in 1842 and from St. John's College, Cambridge, in 1848. He was elected a fellow of his college in 1849 and became a lecturer and tutor. He was elected a fellow of the Royal Society in 1862. Todhunter was a man of high attainments in various branches of learning, but is best known as the author of numerous mathematical text-books. His most important works are: *Treatise on the Differential Calculus* (1852); *Analytical Statics* (1853); *Plane Co-ordinate Geometry* (1855); *Examples of Analytical Geometry of Three Dimensions* (1858); *Algebra* (1858); *Trigonometry* (1859); *The Theory of Equations* (1861); *History of the Progress of the Calculus of Variations during the 19th Century* (1861); *History of the Mathematical Theory of Probability from Pascal to Laplace* (1865); *History of the Mathematical Theories of Attraction from Newton to Laplace* (1873); *The Conflict of Studies* (1873); *Laplace's Functions* (1875); *History of the Theory of Elasticity.*

TODHUNTER, JOHN: Irish poet and dramatist: b. Dublin 1839, Dec. 30. He was educated at Trinity College, Dublin, and after studying at Vienna and Paris, practiced medicine for some years in his native city. He was professor of English literature at Alexandra College, Dublin, 1870-4, and later removed to London. He has published among other works: *Laurella and Other Poems* (1876); *Alcestis* (1879); *A Study of Shelley* (1880); *The Banshee and Other Poems* (1888); and several plays, such as *Helena in Troas* (performed 1886); *The Prison Flower* (performed 1891); *A Comedy of Sighs* (performed 1894).

TODI, *tō'dē* (anc. *Tuder, Tudertum*): ancient town in central Italy, province of Perugia; about 24 m. s. of the city of Perugia, on an elevation overlooking the Tiber. Ruins of the Etruscan wall which surrounded it, and of an old Roman temple, are visible. It contains a cathedral with frescoes by Le Spagna, and the beautiful

church of S. Maria della Consolazione, designed by Bramante, and considered by many not only his best work, but one of the finest buildings of Italy. Pop. about 15,000.

TODLEBEN, *tōt'lā-bĕn*, or TOTLEBEN, FRANZ EDUARD IVANOVITCH, COUNT: Russian general: b. Mitua, Courland, 1818, May 20; d. 1884, July 1. He studied at the College of Engineers at St. Petersburg, and entered the Russian army during its operations against the Circassians in 1848. Having been recognized as a most able engineer in this campaign, he was sent to the Crimea in 1854, where he distinguished himself while under constant fire from the guns of the enemy in the rapid conversion of the city of Sevastopol into a formidable fortress. For this and other valuable service during the Sevastopol campaign he was promoted to the rank of general. At the close of the Crimean war he retired to private life, where he devoted himself to a scientific investigation and to the writing of a history of the war. During the Russo-Turkish war of 1877 he was sent to Plevna, where he compelled the commander, Osman Pasha, to surrender his entire army to the Russians. He was afterward made commander-in-chief of the army at Constantinople. At the end of the Russo-Turkish war he entered political life, and was in his later years governor, first of Odessa, and afterward of the province of Wilna. He published an account of the defense of Sevastopol (French translation *Défense de Sevastopol* 1804).

TODMORDEN, *tŏd-môr'dĕn*, England: a town in Lancashire and Yorkshire, on the Calder, 21 miles northeast of Manchester. The churches of various denominations, town-hall, free library, technical school, etc., are the chief buildings. The industries consist of foundries, machine-works, and manufactories for cotton goods. Pop. (1901) 25,419.

TO'DY: a term applied to a family (*Todiidæ*) of birds closely related to the motmots and kingfishers. They are distinguished by the long flat bill, short and rounded wings, and short and square tail. Only four species are known, all of small size, and inhabitants of tropical America. The green tody (*Todus viridis*) of Jamaica is about 4 inches in length, and green on the upper parts, the flanks rose-colored, the throat scarlet, and the belly pale yellow. The bill is red. It frequents the trees along watercourses, and has the habits of a fly-catcher, taking short flights in pursuit of insects and returning to the perch. They nest in the manner of kingfishers, in holes excavated in banks, and lay 3 or 4 white nearly spherical eggs.

TOE, n. *tō* [Icel. and AS. *tá;* Dut. *teen;* Low Ger. *taan,* a toe: perhaps allied to Icel. *teina,* a shoot: Dut. *teen,* a twig: AS. *tán,* a shoot, the toes being regarded as the twigs or branches of the foot]: a digit of the foot, corresponding to a digit or finger of the hand; one of the

forepartsof the paw or foot of a beast; the forepart of a hoof, as of a horse: V. to touch with the toes, as to *toe* the mark. TOED, a. *tōd,* having toes. FINGER-AND-TOE, a disease in turnips, when, instead of bulbs, they fork into *finger-and-toe*-like divisions.

TOFFY, n. *tŏf'fĭ,* or TOF'FEE, *n. -fĭ:* a hard-baked candy or sweetmeat, made of molasses or sugar mixed with butter, and boiled to a consistency; called *taffy* in the United States.

TOFORE, ad. *tû-fōr'* [AS. *toforan*]: in *OE.,* before; formerly: PREP. in *OE.,* before.

TOFT, n. *tŏft* [Norw. *tuft,* a clearing]: in *OE.,* open ground; a plain; a knoll; in *law,* a messuage or homestead.

TOGA, n. *tō'gă* [L. *toga,* a gown—from *tego,* I cover]: a gown; the loose gown or mantle worn by the anc. Romans. TO'GATED, a. *-gā-tĕd* [L. *togātus,* gowned], also in OE., TO'GED, a. *-gĕd,* dressed in a gown; wearing a gown. TOGA VIRILIS, *vĭ-rī'lĭs* [L. *virīlis,* mainly]: the gown assumed by Roman youths at the age of fourteen. TOGS, n. plu. *tŏgz,* in slang, clothes. TOGGED OUT, *tŏgd,* dressed up, as if for a party.—The *Toga* was the principal outer garment of the Romans, originally perhaps the only one: subsequently an under-garment, the *tunic,* was added. It was probably of Etruscan origin, yet it came to be considered the distinctive badge of the Roman citizen, whence the Roman people are called *togati,* or *gens togata;* consequently, when the Cisalpine Gauls received the rights of citizenship, their country was spoken of as *Gallia togata,* in opposition to Transalpine Gaul, or *Gallia braccata* (breeched). At first the toga was apparently semicircular in shape—so, at least, say Dionysius, Quintilian, and others; but afterward, when it came to be an elaborate and complicated dress, it must have been a smaller segment than a semicircle. The mode of wearing it is difficult to describe, and required considerable art to make the folds fall gracefully. It was woolen cloth, and, except in the case of mourners, was white. Accused persons sought to excite sympathy by going about in a soiled (*sordida*) and unsightly toga; while those who were seeking office were wont to dress themselves in garments artificially whitened with chalk; hence their name *Candidati* (lit., shining ones), candidates. The *toga prætexta* had a broad purple border, and was worn by children and by most, though not all, of the magistrates. The *toga picta,* so called from being embroidered, was worn by generals receiving their 'triumphs.' Under the emperors, the toga as an article of common wear fell into disuse, the Greek *pallium* and other garments being used instead; but it continued to be used by officials on solemn or festive occasions.

TOGETHER, ad. *tû-gĕth'ĕr* [AS. *togædere,* together: Dut. *gaderen,* to gather, to collect]: in company; in the

same place; in the same time; in concert; in union; without break. TOGETHER WITH, in union with.

TOGGENBURG, *tŏg'ghĕn-bûrg,* or TOCKENBURG, *toch'-ĕn-bûrg:* district in Switzerland, in the canton of St. Gall (since 1803); formed by the long and fertile valley of the Thur. It was formerly governed by counts of its own, who ranked as the richest and most powerful land-proprietors in the country. On the extinction of their line 1436, the possessions passed to the Barons of Rasen, who sold them 1469 to the abbot of St. Gall. The valley is thickly peopled by an industrious race, who manufacture muslin and cotton. The most interesting spot in the region is Wildhaus, in the Johannisthal, a little mountain village more than 2,000 ft. above the level of Lake Zürich, where Ulrich Zwingli, Swiss reformer, was born.

TOGGERY, *tŏg'gĕr-ĭ* [L. *toga,* a gown]: in *familiar language,* clothes; garments.

TOGGLE, or TOGGEL, n. *tŏg'gl* [probably from Dut. *tokkelen,* to touch; or Ger. *stock,* a stick]: among *seamen,* a small wooden pin or short bar of wood tapering toward both ends, with a groove round its centre, placed through bight or eye of a rope in order to hold it in its proper position.

TOG'GLE JOINT: a knee-joint or elbow-joint; joint formed by two pieces (bars or plates) articulating endwise. The toggle joint may be represented by the leg flexed at the knee, or the arm flexed at the elbow. In mechanics, this joint is used by applying power (e.g., by means of a screw) against the 'knuckle' or point of flexure, thus producing a powerful pressure through the extension of the two bars or leaves. The toggle joint is employed in different kinds of presses, thence called toggle presses. The toggle joint is utilized in the Stanhope printing-press, the platen being there depressed by the toggle and raised by springs. It is used also in making electrotype molds from type, and in hay-presses, cotton-presses, etc.

TOGO, HEIHAICHIRO, *tō-gō, hā'hī-chē'rō,* Japanese admiral: b. Satsuma, Japan, 1857. He very early became known as one of Japan's most daring naval officers, and a few years before the annexation of the Hawaiian Islands by the United States, he was sent to Hawaii in command of the battleship Naniwa to protect the Japanese who were then complaining of persecution by the government. There he nearly became involved in warfare with United States ship Boston, whose captain supported the demand of the Hawaiian government for the surrender of an escaped Japanese prisoner, and threatened to fire upon the Naniwa. When Togo immediately cleared his ship for action, however, the captain of the Boston apologized and withdrew his threat. In 1895 Togo practically began the war with China by firing upon Chinese transports carrying troops with an evidently hostile pur-

pose. On breaking out of the Russo-Japanese war in 1904 he was appointed commander-in-chief of the Japanese navy and conducted the operations against Port Arthur, and the bombardment of that port, defeated the Russian fleet there, driving it back, after severe fighting, to the shelter of the inner harbor, and damaging several Russian ships. On 27-8 May 1905 he met and annihilated the Russian Baltic squadron, which had come to relieve Port Arthur and Vladivostok under command of Admiral Rojestvensky (q.v.), with a loss of only three torpedo-boats during the entire action. Only a few of the swiftest of the Russian boats escaped, three to Manila, where they were interned by the United States government, and three to Vladivostok. The majority of the boats were either sunk or captured, and those have since been raised, made over and added to the Japanese navy. His flagship, the *Makasa*, was blown up while at anchor on Sept. 10. See RUSSO-JAPANESE WAR.

TO'GOLAND, Africa: a German possession on the Gulf of Guinea, between French Dahomey and the British Gold Coast. It has a coast line of only 42 miles, but extends 325 miles inland, where it becomes a little broader. Area 33,630 sq.m. The coast is low and bordered by lagoons, but the interior is crossed by the escarpment of the Sudan plateau. The country is well watered, the interior by branches of the Volta, which forms the west boundary. The chief products are palm oil, copra, rubber, indigo, and woods. The inhabitants, who number about 2,000,000, are Sudan negroes. In 1902 there were 159 Europeans, 149 being Germans. Commerce is rapidly increasing, and there is regular steamship connection with Hamburg. Togoland was declared a German protectorate in 1884.

TOGUE: a local name in Maine for the lake-trout.

TOGS, n. plu. *tŏgz*. See under TOGA.

TOIL, n. *toyl* [O. Dut. *tuylen*, to till the ground; *tuyl*, agriculture, labor: comp. Gael. *toil*, will, inclination (see TILL 3)]: fatiguing labor; labor oppressive to the mind or body: V. to labor with pain or fatigue; to work with fatigue. TOIL'ING, imp.: ADJ. laboring with fatigue. TOILED, pp. *toyld*. TOILER, n. *-ẽr*, one who toils. TOIL'FUL, a. *-fûl*, wearisome. TOIL'LESS, a. *-lĕs*, free from toil. TOIL'SOME, a. *-sŭm*, laborious; attended with fatigue or pain; wearisome. TOIL'SOMELY, ad. *-lĭ*. TOIL'SOMENESS, n. *-nĕs*, state of being toilsome or laborious.—SYN. of 'toil, n.': work; labor; exertion; employment; occupation; task; travail; drudgery.

TOIL, n. *toyl*, usually in the plu. TOILS, *toylz* [F. *toiles*, toils, something to inclose or entangle wild beasts in; *toile*, cloth—from L. *tēla*, a web—from *texĕrĕ*, to weave]: a net or snare; a web or string spread for taking prey.

TOILET, n. *toyl'ĕt* [F. *toilette*, toilet-cloth, toilet—from *toile*, cloth (see Toil 2)]: a cloth thrown over the shoulders while dressing the hair or beard; the cloth that covers a dressing-table—hence, the dressing-table itself; mode or operation of dressing; all matters connected with personal cleanliness and the adjustment of articles of dress—in these last two senses also spelled Toilette. Toil'inette', n. *-ĭ-nĕt'* [F.]: a cloth the weft of which is of woolen yarn, and the warp of cotton and silk. To make one's toilet, to dress.

TOISE, n. *toyz* [F. *toise*, a fathom: It *tesa*, tension—from L. *tensus*, pp. of *tendo*, I stretch—as if measured by the width of the outstretched arms]: old French measure of length, equal to 1·94903659 metres, or 6·3946 Eng. feet.

TOKAT, *tō-kât':* decayed town of Turkey in Asia, w. of Trebizond, 60 m. from the s. shore of the Black Sea; at the mouth of a defile, on the banks of a small stream. It is inclosed by mountains on three sides, so that in summer the heat is intolerable. Gardens and vineyards extend along the slopes of the valley above the town. The town consists principally of wooden huts, disposed in narrow and dark streets. It formerly had considerable trade, but this has declined. Extensive copper-furnaces, however, in which copper ore, brought from near Diarbekir, is smelted, still employ many persons. Cotton-printing and dyeing also are carried on.—Pop. 35,000.

TOKAY, n. *tō-kā'*, a highly prized wine produced from vines grown on the Hegyallya Mountains n. and n.e. of *Tokay*, in Hungary. The T. wine-district comprises about 15,000 acres, the produce from the Mezesmali, a detached rounded eminence near Tokay, being most esteemed. Great care is bestowed on the proper assortment of the grapes (never gathered till fully ripe); also on preparation of the wine—of which about 34 sorts are reckoned; but all may be grouped into the two classes, sweet and dry. The wine is brownish yellow while new, changing to a greenish hue as it grows older. The average annual produce of the T. vineyards is 1,500,000 imperial gallons of the dry, and 50,000 gallons of the sweet, wines. T. wine has immense reputation on the continent for its restorative and tonic qualities; and so much is it esteemed in Hungary, that every considerable proprietor for miles round makes it a point to acquire some property in this vine-district, that he may be able to procure his wine from his own vineyards. On this account, genuine T. (specially the more valuable sweet or imperial T.) is obtainable by wine-merchants in small quantity only, and is largely mixed with inferior wines. The vine-gathering is celebrated at Tokay, Maad, and Tallya, chief places of the district, as a national fête, to which the magnates of Hungary with their families flock from all quarters; and during the festivity, many times more than the whole value of the vintage is expended. The crowd of visitors is swelled largely by the wine-dealers and medical agents, who sometimes give extravagant prices for good qualities

of wine. Large quantities of 'imitation' T. are made by French and German chemists, and sent to all parts of Europe, not excepting Hungary itself, so that purchasers need to guard against imposition.

TO-KEI': a variant of Tōkiō (q.v.).

TOKEN, n. *tō'kn* [Goth. *taikns;* Ger. *zeichen*, a mark, a token: Icel. *teikna;* Dan. *tegne*, to mark, to draw: Dut. *teeken;* Icel. *teikn*, a token]: something meant to represent another thing; a mark; a sign; an indication; a symptom; a memorial of friendship; a stamped piece of metal used as coin, but worth much less than its nominal value, and intended to serve a temporary purpose: in the *Scotch Presb. churches*, a stamped metal ticket of admission to the Lord's Supper: in *printing*, ten and a half quires of paper: V. in *OE.*, for BETOKEN. TO'KENLESS, a. *-lĕs*, without a token.—*Tokens*, or stamped pieces of metal or other material intended to serve as evidences of value which they did not possess, first came into use in England in the reign of Henry VIII., in the lack of any authorized coins for the fractions of a penny; and in the

Fig. 1.—Token of the Triumph, or Pageant Tavern, Charing Cross, 1661.

reign of Elizabeth, stamped tokens of lead, tin, and even leather, issued by vintners, grocers, and other tradesmen,

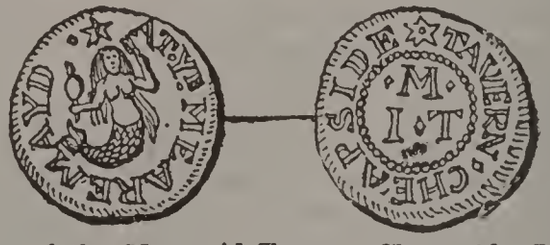


Fig. 2.—Token of the Mermaid Tavern, Cheapside, London, about beginning of 17th century.

passed largely from hand to hand, and were payable at the shops where issued. The corporations of Bristol, Oxford, and Worcester also had their tokens. In the face of later royal prohibitions, private tokens, principally of brass, continued to circulate, especially during the civil war. Numerous tradesmen's tokens, mostly of copper, were again struck during the scarcity of money at the close of the 18th c. On account of the scarcity of current silver money, previous to the new coinage of 1817, silver pieces known as Bank Tokens, of the respective values of 5*s.*, 3*s.*, and 1*s.* 6*d.*, were issued by the Bank of England: they were called in on the revision of the coinage.—See Chambers's *Book of Days*, I. 535.

TOKIO.

TOKIO, *tō'kyō*, or TOKYO: capital of Japan, situated in 35° 49′ N. Lat. and 139° 54′ E. Long., at the head of the bay of the same name in Musashi Province, facing the Pacific Ocean. The city is generally flat and there are many rivers running through it, the largest being the Sumida, which enters the city from the northeast and pours into the bay. The city proper covers an area of about 36 sq.m. and has a population of about 2,000,000. The climate is temperate, but strong winds prevail during the four seasons. There is little rain.

History.—Tokyo was formerly called Yedo and is comparatively modern, having been founded in 1457 by Ota Dokan, chief retainer of Uyesugi Sadamasa, one of the feudal lords at the time, who built a castle, round which a town speedily arose. The occupant of the stronghold repeatedly changed till 1590, when Toyotomi Hideyoshi, then the practical ruler of the whole of Japan, granted the castle to Tokugawa Iyeyasu, who at once made his entry into it. After the fall of Hideyoshi, Iyeyasu proclaimed himself a Shogun and founded his government in Yedo. Establishing their position in Yedo, the Tokugawa family actually ruled the country for nearly 300 years, during which time the city was greatly developed. It was, as is the case at present, the centre of the political, commercial and literary activity of the nation, and all the feudal lords were obliged to reside in the capital every other year. When the Shogunate government was pulled down and the Emperor at Kyoto was restored to power in 1867, the Imperial Court found it advisable to remove to Yedo, which was done two years later, the Emperor establishing his palace on the site of the old castle. The city was then renamed Tokyo, or Eastern Capital, and has since become the seat of the central government.

Government.—The government of the city is conducted according to the municipal law proclaimed in 1888. Its municipal assembly is elected by popular vote, and this assembly elects the mayor and members of the aldermen's council. The mayor, assisted by the aldermen's council, of which he acts as chairman, conducts the administration of the city. For administrative purposes Tokyo is divided into fifteen *ku* or wards, each of which is presided over by a chief appointed by the mayor, and each *ku* has an assembly elected by the inhabitants. These *ku* and six *gun* (suburban districts) constitute Tokyo prefecture over which a governor, as in other prefectures throughout the country, is appointed by the central government. The prefecture has an assembly composed of representatives from the *ku* and *gun*. Public order is maintained by a well-organized force of police consisting of 3,450 officers and men in 1907, under an inspector-general whose jurisdiction extends over the whole prefecture, including the city of Tokyo. The inspector-general of police is like the governor, appointed by the

central government, and is under the direct superintendence of the minister of state for home affairs, not of the governor as in other prefectures. There is a fire brigade (1,850 officers and men in 1907) connected with the police system.

Hospitals, Schools and Libraries.—There are about 70 hospitals of good standing, including the Komagome Hospital for epidemics and the Tokyo Charity Hospital. The former is supported by the city and the latter by the Imperial Court. There also exists an asylum for orphans of the poor, established by the city. According to the latest returns on educational affairs there are 438 public and private primary schools and kindergartens. The number of children of school age is 157,894, of whom 123,441 are in attendance. There are also 34 middle schools, public and private, of which six are for girls. The schools higher than middle grade and placed under the direct control of the Department of Education number 13, including the Tokyo Imperial University, First High School, Tokyo Higher Commercial School, School of Foreign Languages, Tokyo Higher Technical School, Higher Male Normal School and Higher Female Normal School. Besides there are two public normal schools, supported by the Tokyo Prefecture. The Keiogijiku, Waseda and Women's University are most prominent among the private high class institutions, among which are included ten other colleges of law, economics, philosophy and religion. In addition to those above mentioned, there are 281 public and private schools, mostly of the middle school grade, teaching special subjects. Thus the total number of the institutions of learning throughout the city of Tokyo is 781. The city has a number of libraries opened to the public, including the Imperial Library at Uyeno Park.

Sanitary Conditions, Etc.—The sanitary condition of the city is in a fair condition, though street drainage is not so well advanced as in western countries. Each *ku* has sanitary organizations supported by rate levies from the inhabitants themselves. The general health of Tokyo is good, the number of deaths in 1905 being a little over 1.7 per cent. of the whole population. The supply of drinking water was conducted during the Tokugawa regimé by means of canals from the rivers running in the suburbs, but this primitive system was subsequently improved and in 1898 new and modern waterworks were constructed. Almost every house of the city is supplied by the waterworks.

Public Works, Buildings, Etc.—The metropolis is well supplied with parks and open spaces. The largest parks are the Shiba, Uyeno and Hibiya parks. In the first two are beautiful temples connected with the old Tokugawa family, and here the remains of the Shoguns are buried. At Uyeno also is the Imperial Museum.

In regard to means of communication, the city is also

well supplied; electric trains under one management traverse the principal streets, and the *jinrikisha* is in common use, but its days are gradually drawing to a close. Automobiles are being introduced and recently an 'autobus' company capitalized at 5,000,000 *yen* was formed. With exceptions, the streets of the city are still narrow and irregular. But reforms are being carried out on an extensive scale by the municipal authorities, the work being assisted by the central government. Buildings are being changed and old houses are being replaced by those of modern style. The great mansions of the old feudal lords, which were at one time the chief characteristics and perhaps the glory of the city, have been demolished and many brick and stone buildings have taken their place. The municipal assembly provided for the construction of harbor works at the cost of 37,000,000 *yen*. This great work will be completed in 1915.

TOKIO, UNIVERSITY OF: an imperial university first formed in 1868 by the union of two older institutions, under the name Tokio University. In 1877 there were faculties of law, science, literature and medicine; in 1885 a course in engineering was added; and in 1886 the name was changed to the Imperial University of Tokio. In 1890 the Tokio School of Agriculture and Forestry was added. The administration is vested in the president and a council consisting of the head and one professor from each faculty.

Nearly 30 newspapers are published in Tokyo, the principal of which are the *Jiji, Asahi, Nichi Nichi,* and *Kokumin*. The *Japan Times* is the only English paper and is under Japanese management. Pop. (1909) over 2,600,000.

TÖKÖLY, *tĕ'kėl-yĭ*, or TÖKELY, EMERICH, COUNT: Hungarian patriot: b. in the castle of Kasmark, Zips, 1656; d. near Ismid, Asia Minor, 1705, Sept. 13. He was the son of a Hungarian nobleman, at whose death he engaged in the Magyar insurrection. He distinguished himself as a patriot and soldier in the struggle against Austria, and was created Prince of Transylvania by the Turkish allies of the Magyar insurgents. In 1686 he was given command of 9,000 Turkish soldiers. But he found few adherents on his return to Hungary and in 1688 was defeated by General Heusler, over whom, however, he was enabled to claim a victory at Yernesi in 1689. He took a prominent part in all of the later operations of the Turks in this campaign, and was never pardoned by the imperial government. After the peace of Karlowitz in 1699 he lived at Constantinople, and on the estate given him by the sultan on the other side of the Bosporus.

TOKUGAWA, *tō'kû-gâ'wâ:* family name of the 'dynasty' or line of Shoguns, or commanders-in-chief, who

virtually ruled Japan from 1603, when the Mikado appointed Tokugawa Iyeyasŭ (1542-1616) to the office of *Sei-i-tai-shogun,* or 'Barbarian-subduing-great-general,' to 1868, when the office of shogun was abolished, the feudal system came to an end, and the Mikado took the government into his own hands. The Tokugawas are said to be descendants of the Minamoto, powerful military family which sprang from Emperor Sei-wa in the 9th c. At the time of his appointment as shogun, Iyeyasŭ was lord of Mikawa, and of the eight provinces of the Kwantō (the region e. of the Hakone range of mountains) which he had received in 1590 from Taiko-sama. From 1598 the capital of the Tokugawa was Yedo, now Tōkyō.

TOKUSHIMA, *tō-kô-shē′ma,* Japan: the capital of the prefecture of the same name, and the largest city on the island of Shikoku, situated on the northeast coast. It is an important steamship station. Pop. 61,501.

TOLA, n. *tō′lă* [Skr. *tolna,* to weigh]: in *India,* a weight for gold and silver, about 180 grains troy.

TOLAND, *tō′land,* JOHN: English deistical writer: 1669 (or 70), Nov. 30—1722, May 11; b. near the village of Redcastle, county of Londonderry, Ireland. His parents were Rom. Catholics, and he was brought up in that faith. His baptismal name was Janus Junius; but ridicule at school led him to change it to John. He entered the Univ. of Glasgow 1687, but removed to the Univ. of Edinburgh, where he took the degree M.A. 1690. Thence he passed to Leyden, where (having abandoned at Edinburgh the Rom. Cath. faith) he began theological studies with a view to the nonconformist ministry. After about two years he returned to England, and resided at Oxford, where his vanity, and the boldness of his opinions on religion, attracted notice. Here he prepared in great part the work *Christianity Not Mysterious* (London 1696), in which he avowed his principles. The work made a sensation in the theological world, was censured by convocation, and led to several replies; and in the following year Toland returned to Ireland. There he was received as unfavorably as in England, and his book was burned publicly by the common hangman, by express vote of the Irish parliament. Toland returned to London, where he published a defense; but soon turned from theological to political and literary subjects. His pamphlet *Anglia Libera,* on the succession of the House of Brunswick, led to his being received with favor by the Princess Sophia at the court of Hanover, and to his being sent on a kind of political mission to some German courts.

During his residence abroad, he published 1702 a vindication, in a moderate tone, of his book against the judgment of the convocation; but 1705, he fully avowed himself a pantheist, being emboldened by the patronage of Harley, in whose service he had engaged as a political pamphleteer, and by whom he was sent to Holland and

Germany 1707, in a capacity which, however disavowed, was plainly that of a political spy. He returned to England 1710; and having separated from his patron, he engaged as a partisan pamphleteer on the side of Harley's adversaries. His after-life was that of a literary adventurer, and was checkered by literary conflict and pecuniary struggle—forming one of the most painful chapters in Disraeli's *Calamities of Authors*. He died at Putney.—Of his many works, a few are the following: *Christianity Not Mysterious: a treatise showing that there is nothing in the Gospel contrary to Reason, nor above it* (Lond. 1696); *Apology for Mr. Toland* (1697); *Life of Milton*, prefixed to Milton's works, 3 vols. folio (1698); *Anglia Libera, or the Limitation and Succession of the Crown explained and asserted* (1701); *Vindicus Liberius, or Mr. Toland's Defence of Himself against the Lower House of Convocation* (1702); *Socinianism truly stated* (1705); *Reasons for naturalizing the Jews* (1714); *State Anatomy of Great Britain* (1714); *Nazarenus or Jewish, Gentile, or Mahometan Christianity* (1718).

TOLBOOTH, n. *tōl'bôth:* a booth or stall where taxes were collected; a town jail or prison.

TOLD, v. *tōld:* pt. and pp. of Tell (q.v.).

TOLEDO, n. *tō-lē'dō:* a sword-blade of the finest temper, originally from *Toledo*, in Spain; a sword having such a blade.

TOLEDO, *tō-lē'dō:* city, port of entry, and cap. of Lucas co., O.; on the Maumee river, and on the Wabash and the Miami canals, and the Pennsylvania, the Ohio Central, the Lake Shore and Michigan Southern, the Hocking Valley and many other railroads. As a commercial centre, T. occupies an unusually advantageous position. It is 5 m. from the mouth of the Maumee river in Maumee Bay, the w. extremity of Lake Erie; and 8 m. from the lake proper: it thus has direct communication with all ports and important places on the lake. The beautiful harbor will accommodate the largest vessels, and the river and bay afford a safe channel from the city to the lake. The numerous railroads and the two canals are factors of vast importance in the development of the city's commerce and trade. For years, much as they relieved the pressure on the river, bay, and lake traffic, that traffic increased so rapidly that the channel was entirely inadequate to the demand on it. In this emergency the federal govt. came to the aid of the city, constructed a new and straighter channel, and also improved the river channel, the whole cost amounting to at least $3,000,000. T. has become one of the most important grain-shipping cities of the United States; the first grain ware-house was built as early as 1817, and in 1838 a crude horsepower corn elevator was constructed, said to be the first in the West. In 1904 there were 12 grain elevators with a capacity of over 8,000,000 bushels. T. also has an important export trade in soft coal, which comes to the city from West Virginia, Ohio and Pennsylvania, and is shipped

to the lake ports. There is also a large trade in iron ore, lumber, and salt. The manufacturing interests of Toledo are also of importance, owing largely to the proximity of fuel. In addition to the abundance of coal, petroleum and natural gas veins have been discovered in the northwestern part of the state. Natural gas is brought into the city from West Virginia, as well as from the Ohio fields, but, though it has been employed in manufacturing, is now used only for household light and fuel. Among the important industries are flour and grist mills, blast furnaces and foundries, wagon and bicycle factories, car construction and railroad shops, planing and molding mills, and petroleum refineries. There is (1904) over $32,000,000 capital invested in manufacturing, and 1,162 establishments, and 21,000 wage earners employed. Among the more important single establishments are the winter wheat mill of the National Milling Company, the plant of the Toledo Furnace Company, and the factories of the Milburn Wagon Company and the Ford Plate Glass Company.

The city is well laid out; the streets are wide, well shaded in the residence sections; and the drainage is excellent. There are numerous electric car lines within the city limits in addition to several interurban lines connecting T. with Cleveland, Detroit, and other cities. There are a number of large parks, including Ottawa Park, Bay View Park, Central Grove Park, Riverside Park, and Collins Park, besides numerous smaller parks and squares. One of the most notable buildings of the city is the court-house, in front of which is a statue of Pres. McKinley, unveiled 1903. Among the charitable institutions are several hospitals, two Orphans' Homes, the County Children's Home, an Old Ladies' Home, a training school for nurses, and the State Hospital for the Insane, the first in the state to adopt the separate cottage system. The public school system includes two high schools, and a manual-training school; the Toledo Normal School is also under city control. There is a public library, which occupies a large central building, and has charge of several branches, and a Museum of Art. T. is also the seat of the Toledo Medical College, two business colleges, and a number of private secondary schools.

In colonial days, the Maumee river was an important route in the settler's trade with the Indians; and a few scattering settlements were made within the present limits of the city of T., but none of any permanent importance until after 1800. In 1817, one settlement was begun under the name of Port Lawrence; and in 1832 another, called Vistula. Considerable rivalry in trade between the two existed until they were finally consolidated under the name of Toledo in 1833. The town grew slowly until after the completion of the Wabash canal in 1843 and the Miami canal in 1845. But since that time its growth in both commercial importance and in population has been rapid. T. was incorporated as a city in 1846, the charter provides for a mayor, elected every two years, a city council, of which three members and the president are elected at-

1. Riverside Park.
2. McKinley Monument, Court House Square.

large, and a board of public service, a board of public safety, both appointed. Pop. (1890) 81,434; (1900) 131,822.

TOLEDO, *tō-lē'dō*, Sp. *tō-lā'thō:* the famous city of Spain, cap. of the province of T., and long the cap. of Spain; on the n. bank of the Tagus, by which it is encompassed on three sides; 55 m. s.s.w. of Madrid by railway; on a number of hills, about 2,400 ft. above sea-level. The climate, excessively hot in summer, is bitterly cold in winter. The Tagus is the great fortress of the town. Rushing around it, on the e., s., and w., between high and rocky banks, it leaves only one approach on the land-side, which is defended by an inner and an outer wall, the former built by the Gothic king Wamba in the 17th c., the latter by Alfonso VI. 1109 —both remarkable for the number and beauty of their towers and gates. Seen from a distance, the city has an imposing appearance; within, it is gloomy, silent, inert; and its narrow streets are irregular, ill paved and steep. In the midst rises the lofty, massive cathedral, surrounded by numerous churches and convents, mostly deserted, for here the churches are without congregations, and the streets and walks are almost without people. The cathedral, completed 1492, on the site of a former mosque, is a large edifice in simple, pointed Gothic. It was plundered 1521 and 1808, but previously its interior was most magnificent. The stained glass that remains is superb; the choir is a museum of high-class sculpture; and there are two pulpits of metal, gilt, whose workmanship is as fine as that of the richest plate. The cathedral is 404 ft. long, 204 ft. wide; and is divided by 84 pillars into 5 naves. Connected with the cathedral are an extraordinary number of chapels, of great interest, alike from their architectural beauty, their decorations, and their historical associations. The Zocodover, 'square market,' thoroughly Moorish in its architecture, is a fashionable promenade, and was for years the site on which heretics were burned and bull-fights took place. The *Fabrica de Armas*, or manufactory of Toledan swords, a huge, rectangular, unsightly building on the right bank of the Tagus, was erected 1788, though long before that time the Toledan blades had become famous; and the fondness of the Iberians for their weapons, as well as the weapons themselves, was the theme of Livy and Polybius. The temper of the best Toledan blades is such 'that they are sometimes packed up in boxes, curled up like the mainspring of a watch.' The buildings of the town include a theol. seminary, milit. school, female college, hospitals, and manufactories of coarse woolens, paper, guitar-strings, and leather.

T., the *Toletum* of the Romans, was of very early origin and was taken by Marius Fulvius B.C. 193. It was cap. of the Goths during their dominion; 714–1085 it was in the possession of the Moors, and then was permanently annexed to the crown of Castile. In its highest prosperity it is said to have had 200,000 inhabitants.—Pop. (1910) 168,497.

TOLEDO WAR, The: a name popularly given to the contest over the division line between Michigan on the north and Indiana and Ohio on the south. It arose out of an error in the location of the southern point of Lake Michigan. In 1805 the Territory of Michigan was organized in conformity with the Ordinance of 1787, which provided that the line between Ohio, Indiana, and Illinois on the south, and the territory on the north, should be 'an east and west line running through the southern point of Lake Michigan.' This was set down on the maps of the times 42° 32′ N., but when Michigan was organized it was found that the true line through the southern point of Lake Michigan was 65 miles to the south, or 41° 37′ 19″ N., and this more southerly line was adopted. But when Indiana and Illinois were organized as states, the northern line was adopted, and there was thus left a belt 65 miles broad claimed by both factions. Congress ordered a survey, which was completed in 1817, establishing the 'Harris' line, near the northern one. But the people of Michigan protested vehemently, as the city of Toledo was in the disputed belt. In 1836 Ohio by act of legislature organized townships in this territory, which had long been under the control of Michigan. Then both Michigan and Ohio appealed to President Jackson, but got no relief. The governor of Ohio called out the militia, the governor of Michigan did likewise and occupied Toledo. When it seemed as if a conflict could no longer be prevented the matter was settled by the admission of Michigan to the Union as a state upon condition of her acceptance of the 'Harris' line, and giving her in recompense the northern part of the peninsula of Wisconsin. Michigan accepted the conditions and entered the Union as a state 1837, Jan. 26.

TOLERABLE, a. *tŏl′ĕr-ă-bl* [F. *tolérable*—from L. *tolerab′ĭlĭs*, that may be endured—from *tolĕrō*, I bear, I endure]: that may be borne or endured; supportable; moderately good or agreeable; not very excellent or pleasing; passable. Tol′erably, ad. *-blĭ*, in a manner that may be endured; passably. Tol′erableness, n. *-bl-nĕs*, the state of being tolerable. Tol′erant, a. *-ănt* [F. *tolérant*—from L. *tolĕrans* or *tolĕran′tem*, tolerating]: enduring; suffering to be, or to be done; indulgent. Tol′erantly, ad. *-lĭ*. Tol′erance, n. *-ăns* [F.—L.]: patience and indulgence toward those whose opinions or practices differ from our own: in *minting*, the amount of deviation in fineness and weight permitted by law in gold and silver coins; permissible departure from the standard fineness and weight of coins (see Mint). Tol′erate, v. *-āt* [L. *tolĕrātus*, tolerated]: to suffer to be; to permit or allow without positive hindrance. Tol′erating, imp. Tol′erated, pp. suffered; not prohibited. Tol′era′tion, n. *-ā′shŭn*, the allowance of that which is not wholly approved; the permission of religious opinions and modes of worship different from those of the established church.

TOLERATION, Religious: measure of liberty which, in some countries where a particular form of religion is established by law, is allowed to nonconformists publicly to teach and defend their theological and ecclesiastical opinions, and to worship whom and as they please, or not at all: however, no permission is given to violate the rights of others, or to infringe laws designed for protection of decency, morality, and good order, or for the security of the governing power, inasmuch as the enforcement of those laws which have merely civil and political objects in view is indispensable to the public welfare, and must proceed without regard to any citizen's notions of religious duty. In Britain, and by colonial inheritance of English law in some of the states of the American Union, there still remain some statutes imposing penalties on opinions and practices generally regarded as impious and classed as crimes because of their offensiveness to God (see Blasphemy: Brawling in Churches): but these laws are now seldom executed—the opinion having become prevalent, that, except when the religious feelings of the Christian public are so wantonly outraged as to make the perpetrator a nuisance, wrong practice in religion is best overcome by personal moral influence, and that when those accused of Heresy (q.v.) are men of piety and sincere conviction, any degree of severity short of extirpation tends rather to further than to suppress their tenets. Besides, the right of private judgment in matters of faith and worship is now more generally recognized *in practice* than formerly, though even yet multitudes resent the exercise, by their neighbors who differ from them, of the freedom which they claim for themselves—forgetting the principle applied by the apostle Paul to the case of religious differences (Rom. xiv.). The right of private judgment is a lesson that has been slowly learned. The Reformers, who on no other ground could justify their separation from the church of Rome, became in their turn the persecutors, not only of the Romanists, who had persecuted them, but also of such fellow-Protestants as had drawn from Scripture conclusions differing from their own. See Calvin: Servetus: Socinus: Biddle: Jews. In a church claiming Infallibility (q.v.), and believing that salvation is unattainable beyond her pale, it is not only consistent, but to her most earnest members must seem a duty, to prevent by force the spread of what is accounted a fatal heresy; and, in fact, toleration has not been professed or practiced by the Church of Rome. See Albigenses: Waldenses: Dominicans: Inquisition: Huguenots: Bartholomew's (St.) Day: Nantes, Edict of: Cevennes: Dragonnades. But even the Puritans (q.v.), —at least the Presbyterian section of them—though long oppressed themselves, were so blind to the right of others to differ from them, that in their own brief day of power they repudiated by word and deed, as a monstrous and impious error, the principle which Oliver Cromwell (q.v.), far in advance of his times, earnestly advocated, of a universal toleration in religion. In the Assembly of Divines

(q.v.) at Westminster 1643-46, the Presbyterian members contended successfully against the proposal of the Independents that all sects should alike be tolerated. 'We hope,' wrote Baillie to his Presbyterian friends in Scotland, 'that God will assist us to remonstrate the wickedness of such a toleration. . . . For this point, both they and we contend *tanquam pro aris et focis*' (Baillie's *Letters*, II. 328, 350; Bannatyne Club ed.: see also the strong expressions of George Gillespie, another member of the assembly, in his *Propositions concerning the Ministry and Government of the Church*, prop. 41 and 42). We accordingly find in the 23d chapter of the *Westminster Confession* an assertion of the duty of the magistrate to promote the true religion, and to restrain and punish heterodoxy—a principle which, soon after the Restoration, was found to work very inconveniently for the Presbyterians themselves, the magistrate being then one who differed from them as to what the true religion was. The Independents of that day, on the other hand, trusting less to ecclesiastical safeguards and more to spiritual forces, set a pattern of religious tolerance which some who claimed to be of their party on this side the Atlantic deemed it unsafe to follow, and which almost the whole Christian world for a century thereafter strongly contemned. Those of the Independents who took refuge in Holland doubtless found their principles of toleration strengthened in that nursery of political liberty in modern Europe. See PILGRIM FATHERS, THE. In the 16th c., Zuinglius and the Hungarian reformer Dudith, disclaimed, by word and action alike, the notion that any Christian man is entitled to assume that the right of private judgment in interpretation of Scripture pertains only to him and his party, and is to be denied to Christians who differ from him. It is chiefly to the many keen discussions in Holland and England in the century which followed the Restoration (aided, no doubt, by that moderation or indifference which characterized the Prot. churches a hundred years ago—by the increasing number and power of the dissenters in England —and by that wider mental culture which enables men not only to see that diversity of mental gifts and acquirements naturally leads to diversity of opinion, but, in Cromwell's language, to 'think it possible that they may be mistaken'), that we must ascribe the tolerant spirit actuating most of the statesmen of England and the United States in the 19th c., and which has recently increased rapidly among the people at large. One indication of this progress is the fact that the term Toleration is not accepted in this country as expressing the attitude proper for the government toward religious systems or organizations. To *tolerate* is to endure, permit, or allow; and the sensitiveness of liberty has become too keen to accept as a permission from any human authority of that which is a natural indefeasible right.

Not only is the *right* of free thought and discussion now generally recognized, but its *necessity* to the well-being of mankind is asserted by eminent thinkers. John Stuart

Mill, in his able treatise *On Liberty*, thus sums up the grounds on which the necessity of such freedom is affirmed by him: '(1) If any opinion is compelled to silence, that opinion may, for aught we can certainly know, be true. To deny this, is to assume our own infallibility. (2) Though the silenced opinion be an error, it may, and very commonly does, contain a portion of truth; and since the general or prevailing opinion on any subject is rarely or never the whole truth, it is only by the collision of adverse opinions that the remainder of the truth has any chance of being supplied. (3) Even if the received opinion be not only true, but the whole truth—unless it is suffered to be, and actually is, vigorously and earnestly contested, it will, by most of those who receive it, be held in the manner of a prejudice, with little comprehension or feeling of its rational grounds. And not only this, but (4) the meaning of the doctrine itself will be in danger of being lost, or enfeebled, and deprived of its vital effect on the character and conduct: the dogma becoming a mere formal profession, inefficacious for good, but cumbering the ground, and preventing the growth of any real and heart-felt conviction, from reason or personal experience' (p. 95).

See Jeremy Taylor's *Liberty of Prophesying;* Milton's *Areopagitica*, his *Treatise of Civil Power in Ecclesiastical Causes*, and his treatise *Of True Religion, Heresy, Schism, Toleration, etc.;* Dr. John Owen's *Indulgence and Toleration Considered;* Barclay's *Apology for the Quakers*, prop. 14; Locke's *Letters concerning Toleration*, and treatise *On the Conduct of the Understanding;* Bishop Hoadley's *Sermons*, and *Dedication to Pope Clement XI.;* Ibbot's *Boyle Lectures on the Right, Duty, Benefits, and Advantages of Private Judgment;* Paley's *Moral Philosophy*, bk. 6, chap. 10; Sydney Smith's *Letter to the Electors on the Catholic Question;* Disraeli's *Curiosities of Literature*, article 'Toleration;' Hallam's *Literature of Europe* (Part III., chap. 2); Whately's *Essays on the Errors of Romanism, etc.;* J. Blanco White *On Heresy and Orthodoxy;* Brook's *History of Religious Liberty;* James Martineau's *Rationale of Religious Enquiry;* Samuel Bailey's *Essay on the Formation of Opinions*, and *On the Pursuit of Truth;* Tayler's *Retrospect of the Religious Life of England;* Edgar Taylor's *Book of Rights, or Constitutional Rights and Parliamentary Proceedings affecting Civil and Religious Liberty in England from Magna Charta to the Present Time.*—As to the manner in which the early Christians became liable to punishment under the Roman laws, see Neander's *History of the Christian Religion and Church*, I., p. 118, Bohn's ed.; Gibbon's *Decline and Fall of the Roman Empire*, chap. 16, compared with chap. 2; Dr. Taylor's *Elements of Civil Law*, App.: also, in the present work, ANTONINUS, MARCUS AURELIUS: DECIUS: PERSECUTIONS.

TOLL, v. *tōl* [Icel. *tall*, deceitful: W. *twyll*, deceit, illusion: Bret. *touella*, to enchant, to allure: OHG. *tollon*, to stroke: originally meant, 'to incite one to do a thing, to draw, to entice']: to stroke or ring slowly, as a bell to invite the people into church; to sound a bell with slow uniform strokes (especially by striking with a hammer or the like and without swinging) in order to announce a death, or to give solemnity to a funeral; in *OE.*, to draw by degrees; to entice: N. the slow repeated sounding of a bell at short intervals. TOLL'ING, imp.: ADJ. sounding as a tolled bell: N. the act of one who or that which tolls. TOLLED, pp. *tōld:* ADJ. rung, as a bell.

TOLL, v. *tōl* [L. *tollo*, I take away]: in *law*, to take away; to vacate; to annul.

TOLL, n. *tōl* [Dut. *tol;* Dan. *told;* Ger. *zoll;* Icel. *tollr*, custom, toll: Gr. *telōnĭŏn*, a custom-house—from *telos*, a tax, toll]: duty or tax imposed on travellers or goods passing along a bridge or a public road or the like; tax paid, or duty imposed, for some liberty or privilege, as for permission to erect a stall in a market; payment for passage; a miller's compensation for grinding corn. In general, toll is a payment exacted by express statute, or (in former times) by some prescriptive usage or under a royal grant, e.g., by the owner of a port for goods landed or shipped, by the owner of a market or fair for articles sold, or specifically by those charged with maintenance of roads, streets, bridges, etc., for the passage of persons, goods, or cattle. It is essential in a toll that it be for some reasonable consideration; otherwise, it is void. The first recorded royal commission for a road-toll in England was granted by Edward III. 1346. In modern times the right to take toll is always created by statute, and nothing short of statutory authority will authorize its levy, for it is a species of tax.

Many tolls receive special names, as dues, customs, etc.; and the term toll is now mostly used in connection with turnpike roads (so called from the turnpike, or gate turning on an upright axis or pike, at which the tolls are collected) and bridges. See HIGHWAY. Turnpike tolls, formerly much in use in the United States, have, in recent years, been in gradual process of abandonment, and a similar reform has been applied in Great Britain. TOLL, v. in *OE.*, to impose a toll on; to exact, as a tax or tribute; to pay toll. TOLL'ABLE, a. *-ā-bl*, subject to the payment of toll. TOLL'AGE, n. *-āj*, payment of toll; the amount paid. TOLL-BAR, a beam or gate across a road at a toll-house to prevent vehicles passing without paying toll. TOLL-BOOTH, n. *-bôth*, originally, a booth for the collection of tolls; subsequently a prison—in this sense now spelled TOL'BOOTH. TOLL-GATE, a gate where toll is taken. TOLL-GATHERER, one who collects tolls. TOLL-HOUSE, the house where the toll-gatherer resides.—SYN. of 'toll, n.': tax; impost; cess; custom; duty; assessment; rate; tribute; charge; levy.

TOLLENS, *tōl'ĕnz*, HENDRIK: popular Dutch poet: 1780, Sep. 24—1856, Oct. 21; b. Rotterdam. In his 17th year he began to make French literature his favorite study, and translations of French tragedies his chief work. At 19 he

published translations from the French poets, *A Nosegay of Fragrant Flowers culled on French Ground.* Three years later appeared his *New Songs and Idyls.* In 1805 appeared his tragedy of *Lucretia;* and 1806 that of the *Hoekschen and Kabeljaauwschen,* or the Contest between the Nobility and the Towns in Holland, in the olden time—both original pieces. Of his series of songs and poems were: 'William I.,' the 'Victory at Nieuwpoort,' the 'Four Days' Naval Fight,' the 'Cry to Arms in 1815,' the 'Wintering of the Dutch in Nova Zembla,' and the 'National Song of the Netherlands.' His patriotism and deep warm feeling are shown in 'The Evening Prayer' and 'The General Prayer-day.' T. published also *Romances, Ballads, and Legends* (1818); *New Poems* (1821–29); *Songs of Claudius* (1832); *Poetical Flowers gathered from Neighboring Nations* (1839); *Scattered Poems* (1840); two vols. (1850). T. ranks among the first of modern Dutch poets. His poems touched the heart of the people. The 'Wintering in Nova Zembla' is a wonderful piece of descriptive poetry. In early life, T. belonged to the Rom. Cath. Church, and 1827 joined the Prot. Remonstrants.

TOLMEN, n. *tŏl'mĕn* or *tōl'mĕn* [Celt. *dol,* a table; *men,* a stone: F. dolmen]: a curious, supposed Druidical monument, consisting of a large stone placed horizontally on other upright stones about three or four feet high; also called a *cromleech;* also spelled DOLMEN.

TOLOSA, *tō-lō'sâ:* town in n. Spain, cap. of the province of Guipuscoa, 15 m. s. of the seaport of San Sebastian. It is in a deep valley watered by two streams, and has many old family mansions. There is a royal factory for arms, and in the vicinity are zinc and lead mines.—Pop. about 8,000.

TOLSTOI, *tol'stoy,* Count LYEF (or LEO) NIKOLAIEVITCH: novelist and reformer: b. near Tula Russia, 1828, Aug. 28. He was educated at his mother's estate and at the Univ. of Kazan. Te entered the military service 1851 and served in the Caucasus: there he wrote his first works, *The Cossacks* and *Childhood and Youth.* He was on the staff of Prince Gortshakoff at the outbreak of the Crimean war, 1853; commanded a battery at the siege of Sevastopol; and resigned his commission at the return of peace: he details the harrowing incidents of that siege, as observed by himself, in *Sevastopol in Dec., May, and August.* His next work, *War and Peace,* is perhaps the most realistic presentation of the horrors of war found in any literature. In *Anna Karenina* he first gives expression to his discontent with the moral and social conditions in high Russian society. His views of the Christian religion found expression in the two works *My Religion* and *Christ's Christianity,* and in many smaller tractates. He goes back, as he thinks, to the original spirit of Christianity, and interprets literally the words of Jesus—his promises, his counsels, his commandments—and not in a figurative

sense. Thus, like the Friends, he insists on the absolute necessity of non-resistance to evil and wrong; love of the neighbor is the fulfilling of the whole law of Jesus. His ideal for the social betterment of mankind resembles that of the anarchist-communists, but is based solely on his interpretation of the teachings of Jesus as applied to social conditions. In 1901 he was excommunicated by the Holy Synod of the Russian Orthodox Church, and in his reply to the decree of excommunication, clearly stated his denial of many of the most important orthodox beliefs; he denied the deity of Jesus and the doctrine of the atonement, the orthodox belief in the future life, and the need of creeds or sacraments. Of T.'s works, which are very numerous, many have been translated into French—and of these nearly all into English. He publicly announced, 1891, that whatever he has written is common property of all the world, and may be freely translated and published by every one. Besides the works previously mentioned, there are English versions of *Where Love is there God is Also; The Kingdom of God is Within You; The Kreutzer Sonata; Work while ye have the Light; The Power of Darkness; Master and Servant; Politics and Religion; Patriotism and Christianity; What is Art?;* and *Resurrection*, published in 1900, a novel dealing with Russian social life. His undeniable sincerity, with his vigor of presentation, has directed public attention to some points in Christ's life and teachings, often overlooked by Christians. For many years, T. has renounced the privileges of his status as a nobleman, has worn the dress of the *moujik*, and has lived simply on his estate, doing manual work, in addition to his writing. In the great famine in Russia in 1891–2, T. and his family assisted greatly in organizing relief for the destitute.

TOLTECS, *tōl'tĕks:* cultured race which, coming from the north (according to tradition), was dominant in Mexico from presumably the 7th to the 11th c. To the T. are ascribed the ruined ancient 'cities' and great pyramids of Mexico and Yucatan. These remains prove the T. to have well advanced in architecture and sculpture. Proofs are extant of their proficiency also in the potter's art and in weaving. The numerous hieroglyphic inscriptions on their monuments still remain undeciphered. See John L. Stephens's *Central America, Chiapas, and Yucatan* (2 vols.), and his *Yucatan* (2 vols.); Charnay's *Anc. Cities of the New World;* Nadaillac's *Prehistoric America.* See MEXICO.

TOLU-BALSAM, n. *tō lô'-* [from *Tolu*, on the n.w. coast of New Granada]: a fragrant oleo-resin, the produce of a South American tree—the *Myrosper'mum toluĭf ĕrum*, ord. *Legumĭnōsæ*, sub-ord. *Papilĭon cĕæ* (see BALSAM). TOLUENE, n. *tŏl'ū-ēn*, or TOLUOL, n. *tŏl'ū-ŏl*, a substance allied to benzine, occurring in tolu-balsam, and obtained also from light coal-tar oil.

TOLUCA, *tō-lô'kä*, Mexico: the capital of the state of Mexico, situated 32 miles southwest of the national capital. It stands on the plateau at the foot of the extinct and snow-capped volcano, Nevada de Toluca, 15,000 feet high. The city has a pleasant climate, is regularly built, and contains several handsome buildings. There are a brewery, cotton-mill, and several other manufacturing industries, and export trade in hams and sausages. Pop. (1900) 25,904.

TOLU'RIC ACID: Toluyl-glycocoll, $C_7H_7CONHCH_2COOH$, an acid homologous with hippuric acid and formed in the urine of dogs that have been fed with toluic acid. Colorless, odorless, soluble, prismatic crystals.

TOM, known as BLIND TOM, Afro-American musician: b. near Columbus, Ga., 1849. He was the son of slave parents and blind from his birth. When only four years of age he attracted the attention of his master by a remarkable reproduction upon the piano of music rendered in his hearing, and later astonished the world by his extraordinary performances upon that instrument. He first appeared as a public performer in New York in 1861, and for many years thereafter played in the principal cities of the United States and Europe, where his unparalleled gifts became widely known.

TOM, Asia: a river in Siberia, in the government of Tomsk, rising in the Abakanic Mountains, and after a course of 450 m. flowing into the Obi, near Tomsk, on its right bank. It begins to be navigable at Kusnezk.

TOM, MOUNT: in Hampshire co., Massachusetts, near Mount Holyoke, and overlooking the Connecticut Valley. It is between the cities of Holyoke and Northampton. Thousands of tourists ascend Mount Tom each year on account of the grand view from its summit.

TOM THUMB. See STRATTON, CHARLES SHERWOOD.

TOM-TOM, or TAM-TAM: a native East Indian drum used by musicians, jugglers, public criers, etc. It is generally cylindrical in form, the depth of body being about three times the diameter of the heads, of which there are two. It is made of resonant wood or of hard-baked earthenware, and the heads are covered with skins, drawn tight by side-lacings, as in the modern drum. It is beaten with the fingers or the open hand and produces a hollow monotonous sound. Similar instruments used by the natives of Western Africa receive the name of tom-tom, as do also certain types of Chinese gongs.

TOM'AHAWK: a weapon of warfare of North American Indians, a light war axe. Before the advent of the white traders the head of the axe was usually a piece of stone sharpened at both ends and put through a piece of wood, in the form of a pickaxe; sometimes the stone was shorter and more like a modern double-axe, sometimes

hard horn was sharpened and used in the place of the stone. But the white traders brought the natives iron hatchet heads and the stone ones were gradually discarded. These hatchets had but one cutting edge, the other shorter end being formed into a hammer-head, or oftener into the bowl of a pipe, which communicated with a tubular hollow made in the handle, thus made to serve as a pipe stem. From the custom of the Indians of burying their tomahawks when they made peace with a foe comes the custom of saying that two opponents who have made peace have 'buried the hatchet.'

TOMALES, *tō-mä'lĕs:* a bay on the coast of California, about 35 miles n. of San Francisco. It is a narrow inlet of the Pacific, the railroad is near and parallel to its eastern shore, and Tomales Point is on the west, separating the bay from the ocean.

TOMAN', or TOMAUN': a current gold coin of Persia worth 7s 2½d or about $1.76. The value of the toman is not very constant, since it varies in different localities and according to the government's necessities. At times it assumes a value of about $2.25 or even higher. In Persia it is reckoned as the equivalent of 100 schakis or shakis.

TOMATO: a perennial herb (*Lycopersicum esculentum*) of the order *Solanaceæ*. It is a native of western South America, whence it was introduced into cultivation in Europe during the 16th century. At first the wrinkled fruits were regarded with suspicion or disfavor, and were more popular as garden ornaments than for other purposes. During the 18th century both yellow and red-fruited sorts were known, but not until the middle of the 19th century was there a decided improvement in the form of the fruit. At the beginning of that century the fruits were used to a small extent for pickles and preserves, but less for other purposes. The development of the tomato both in its form and its popularity as a vegetable is mainly due to the care of plant-breeders, who have eliminated the wrinkles from the fruit, and to the development of perfect methods of canning. The annual consumption of tomatoes, both as a salad and cooked or preserved in various ways, aggregates thousands of tons in the United States, where the crop is more widely grown than in any other country of the world. The season opens in mid-winter in Florida and the Mississippi delta, and advances northward until September, when it ends in Canada. Considerable quantities of tomatoes are forced in greenhouses at various seasons, but especially during the spring months.

Though perennial in its native country and in other frostless climates, the tomato is best known in the temperate regions as an annual herb. It is a straggling, clammy, ill-smelling, grayish-green plant with variously formed pinnate leaves and small racemes of small yel-

lowish flowers, followed by fleshy many-seeded berries which in some improved horticultural varieties weigh more than a pound. Several botanical varieties have been recognized, among which the following are best known: Cherry tomato (*L. esculentum,* var. *cerasiforme*), grown in gardens for its little yellow or red globular fruits which are used for home-made preserves and pickles; pear and plum tomato (var. *pyriforme*), similar to preceding except in form of fruit; large-leaf tomato (var. *grandifolium*), a group of varieties originated during the closing quarter of the 19th century, and including some of the most important commercial varieties; the common tomato (var. *vulgare*), the most widely cultivated form in America. One other species is cultivated, more for ornament than for its fruit, which, although edible, is too small for general household use; it is the currant tomato (*L. pimpinellifolium*), also known as the German raisin tomato. The plant is very spreading and branchy, with small egg-shaped leaves and long racemes often bearing more than 30 currant-like red fruits. It has produced hybrids with the preceding species, and is useful for covering unsightly objects during the summer. The former species has been grafted upon its close relative, the potato, but the two plants have never been known to cross-fertilize. These grafts are interesting as curiosities but not otherwise.

Several other plants have been called tomato; the best known are probably the husk tomato (*Physalis pubescens*), also known as the strawberry tomato, ground cherry, and dwarf cape gooseberry. It is popular in gardens for its fruits, which are made into perserves or kept in their husks in cool dry rooms until needed for use in mid-winter. The name strawberry tomato is also given to *Physalis alkekengi,* better known by its specific name and as the winter cherry or bladder cherry. The red fruits are edible, but are not generally relished. The plant is chiefly ornamental on account of its very showy blood-red calyces. The tree tomato (*Cyphomandra betacea*) is cultivated to a small extent for its light brown, egg-shaped fruits, which resemble the tomato in flavor but are rather more musky and acid.

The more progressive tomato growers are alive to the fact that the so-called plant diseases which have been reported injurious to the tomato are more readily prevented by intelligent management of the plants than by the use of so-called remedies. Every effort is therefore made to keep the conditions in the seed bed as well as in the field as favorable as possible. Adequate ventilation, rather low temperature and limited water supply are found conducive to the health of the seedlings. And sturdiness at the time of setting in the field is a safeguard against subsequent troubles. Growers whose methods produce inferior plants, or who are negligent in various other respects, often suffer serious losses.

Many insects feed upon the tomato, but very few are usually numerous enough to do serious damage. The best known are probably the boll-worm (*Heliothis armigera*), the tobacco-worm (*Phlegethontius carolinus*) and various species of cutworms. Flea-beetles, potato-beetles and thrips are also well known enemies. As a rule, however, they are not responsible for serious damage. The larger species are generally picked off by hand and the smaller are driven away to other plants by the use of repellants such as tobacco dust, Bordeaux mixture, etc.

TOMB, n. *tôm* [F. *tombe,* a tomb—from mid. L. *tumba,* a tomb—from Gr. *tumbos,* a mound of earth raised over a dead body, a tomb: It. *tomba;* Sp. *tumba,* a tomb]: a grave; a house or vault in which to deposit the dead; a sepulchre; a monument erected over a grave to preserve the memory of the dead buried there (see below). TOMBED, a. *-tômd,* deposited in a tomb. TOMB'-LESS, a. *-lĕs,* without a grave or a sepulchral monument. TOMB'STONE, n. a stone with an inscription placed over a grave in memory of the deceased.—A *Tomb* is a receptacle for the dead—an excavation in rock or earth, or a vault or chamber either under ground or partly or entirely above ground, to contain the body. It is frequently in the form of a monument over a grave. In early ages, and among eastern nations, it was sometimes the practice to place the remains of the dead in excavated sepulchres, whose interior was often decorated with painting or otherwise. Where the usage was to burn the dead, their bones and ashes were placed in urns in these receptacles. Some of the most remarkable rock tombs were those of Egypt, belonging to the 18th and following dynasty of the Theban kings. The monarch's burial-place began to be excavated as soon as he ascended the throne, and the excavation went on year by year, the painting and decoration progressing till the king's death, when it was suddenly broken off, the tomb thus becoming an index both of the king's magnificence and of the length of his reign. The most costly articles are often found in these sepulchres. The decoration was mostly reserved for their interiors, the façades being comparatively unobtrusive. On the other hand, the rock-tombs of Persia and Lycia, less rich and elaborate internally, have imposing architectural façades, those of the Persian kings being copied from their palaces; and during the Roman period, this species of magnificence prevailed at Petra (q.v.) to an extent that gives that now deserted valley the aspect of a city of the dead. See also ETRURIA.

Tombs, in more modern times, have generally been mounds or masses of building over the remains of the dead. In the Homeric poems, heaps or cairns of stones are placed as honorary memorials above the graves of departed heroes The Sepulchral Mound (q.v.) or tumulus of rude ages is

found over the greater part of n. Europe, and is probably older than the subterranean tomb. The Pyramids (q.v.) were the sepulchres of the Egyptian monarchs from the 4th to the 12th dynasty. The tombs of Greece, and still more those of the Greek colonies in Asia Minor, were sometimes pillars, or upright stone tablets, sometimes small buildings in the form of temples: the most celebrated was the *Mausoleum* (q.v.). The Roman tombs were frequently important architectural structures, varying in form, but oftenest consisting of a circular tower resting on a square basement; familiar examples being the tomb of Cæcilia Metella; and the larger and more solid tomb of Hadrian, on the banks of the Tiber, best known as the Castel St. Angelo, about 220 ft. in height, and of immense solidity. In Rome, Latium, and Magna Græcia, tombs were generally outside the towns, and along the principal roads leading into the country, as in the Via Appia at Rome, and the Street of Tombs at Pompeii. A form of excavated tomb, without external architecture, called *Columbarium* (q.v.), also was in use in Rome, whose walls were pierced with cells to receive cinerary urns. The prevalent circular tomb became in the later Roman empire polygonal; and the central chamber, at first small, was gradually increased, till, in the age of Constantine, it became a miniature representation of the Pantheon, generally with a crypt below the principal apartment.

In the earlier centuries of Christianity the burial of the dead in churches was prohibited. The custom first arose of erecting churches over the graves of martyrs; then followed the permission to kings and emperors to be buried in the church porch. The most important tombs of the middle ages are generally within churches or cloisters. There is much variety in form and enrichment of mediæval tombs. The earlier examples consist of a simple stone coffin or sarcophagus, often with a low gabled lid and a sculptured cross. An altar-tomb, or tomb in the form of a table, followed; and in the 13th c., a species of tomb was introduced, consisting of a sarcophagus, on which rests a recumbent figure of the deceased, the whole surmounted by a canopy often of exquisite symmetry and richness. In the renaissance period of art, the tombs became more and more complex. The sarcophagus was disguised, or made the least important part of the monument; the representation of the deceased was confined to a medallion likeness, and the most prominent part of the tomb was of sculptured upholstery, and groups of symbolical and eventually mythological figures. In some of the 16th c. examples, e.g., Michelangelo's tombs of Giuliano and Lorenzo de' Medici, at Florence, the inappropriateness of the design is partly redeemed by the beauty of the figures; but in the succeeding centuries, the vicious taste of these monuments rapidly increased, till it culminated in some of the hideous tombs that disfigure Westminster Abbey and St. Paul's.

TOMBAC, n. *tŏm'băk* [Mal. *tambaga*, copper]: alloy of copper and zinc; brass with an excess of zinc. WHITE TOMBAC, or WHITE COPPER, alloy of about 75 parts of copper and 25 parts of arsenic, forming a very beautiful metal used in the manufacture of buttons.

TOMBIGBEE, *tŏm-bĭg'bē*, RIVER: affluent of the Mobile river, in Ala.; rising in Tishomingo co., Miss., a little w. of the interstate line, and flowing generally s.e. through four cos. of Miss., entering Pickens co., Ala., at lat. 33° 15′, and joining the Alabama about 45 m. above the head of Mobile Bay; length about 450 m. It is navigable as far as Aberdeen, Miss.

TOMBOLA, *tŏm'bō-la* [F.—from It. *tombola*, a kind of lottery]: kind of lottery; a party or 'fair' at which fancy articles are offered as prizes, each purchaser of a ticket being entitled to a prize if he draws all the numbers on that ticket.

TOMBOOC'TO: see TIMBUKTU.

TOMBOY, n. *tŏm'boy* [*Tom*, and *boy*]: a rude or wild, romping girl; a hoiden; in *OE.*, a harlot.

TOMBSTONE, *tōm'stōn:* city, cap. of Cochise co., Ariz.; 9 m. n.e. of the San Pedro river, 20 m. n.w. of the Mexican boundary, 25 m. s.e. of Florence. It is on the declivity of low hills which separate it from the river, and in a dry valley that gradually rises to the base of the Dragoon Mountains 12 m. distant n.e. The city contains co. court-house (built 1882), municipal building, hotel, large public hall, several churches and public schools, substantial business blocks, system of water-works 20 m. long that cost $500,000, 1 state bank (cap. $50,000), and 1 daily and 1 weekly newspaper. The low hills in T. contain the richest gold and silver mines in Ariz.; and historical interest is claimed for the region in that it was passed by the surviving members of De Soto's little army on its way to Mexico, was visited by Humboldt, and was the scene of early silver-mining by the Spaniards.—Pop. (1880) 973; (1890) 1,875; (1900) 646.

TOMCAT, n. *tŏm'kăt* [from *Tom*, the familiar abbreviation of Thomas, and *cat*]: a full-grown male cat.

TOME, n. *tōm* [F. *tome*, a volume—from L. *tŏmus*, a piece, in mid. L. a book—from Gr. *tomŏs*, a piece cut off, part of a book—from *temnein*, to cut]: a book; one volume of several constituting the same work; generally, any large book.

TOMENTOSE, a. *tō'mĕn-tōs'*, or TOMENTOUS, a. *tō-mĕn'-tŭs* [L. *tomen'tum*, a stuffing for cushions: F. *tomenteux;* Sp. *tomentoso*]: in *bot.*, covered with hairs so close as scarcely to be discernible; having a whitish down-like wool; nappy. TOMEN'TUM, n. *-tŭm*, in *bot.*, the closely matted hair or downy nap covering the leaves or stems of some plants; in *anat.*, minutely divided vessels on the surface of the brain.

TOMFOOL, n. *tŏm'fōl* [*Tom*, the familiar abbreviation of Thomas, and *fool*]: a great fool; a silly trifler. TOMFOOL'-ERY, n. *-ĕr-ĭ*, foolish or senseless trifling; trifles. TOMFOOL'-ISH, a. *-ĭsh*, nonsensical; idiotic; trifling.

TOMIN, n. *tō'mĭn* [etym. doubt.]: jeweller's weight of 10 grains.

TOMIPAROUS, a. *tō-mĭp'ă-rŭs* [Gr. *tomē*, a cutting: L. *părĭō*, I bring forth]: in *bot.*, producing spores by division.

TOMMY, n. *tŏm'mĭ:* in *Brit. slang*, bread; provisions; specifically, provisions or other goods supplied to a workman from a tommy-shop; truck (see TRUCK-SYSTEM). TOMMY-SHOP, a store owned or controlled by an employer, from which his employés are compelled or expected to draw their supplies of provisions, etc., orders on this store being given them instead of money in payment of their wages. TOMMY MASTER, a master who pays his workmen's wages more or less in goods.

TOM-NODDY, n. *tŏm'nŏd-dĭ:* same as NODDY (q.v.).

TO-MORROW, n. ad. *tū-mŏr'rō* [*to*, on, and *morrow*]: the day after the present.

TOM'PION, n.: the iron bottom of a charge of grape-shot: in *lithograph.*, the inking-pad of the lithographic printer. See under TAMP.

TOMPKINS, *tŏmp'kĭnz*, DANIEL D.: vice-pres. United States: 1774, June 21—1825, June 11; b. Scarsdale, N. Y. He graduated at Columbia Coll. 1795, began practice of law 1797; elected to N. Y. constitutional convention and to the state assembly 1801. He was elected to congress 1804, but before taking his seat resigned his office to become a judge of the N. Y. supreme court. He was elected gov. of the state by the democratic wing of the (old) republican party 1807, and was re-elected 1809, 11, 13, and 17 by the united (old) republican party. During his governorship he zealously sustained the policy of Pres. Jefferson, and strongly opposed the establishment in New York of the Bank of N. America. In the war with Great Britain he strengthened with his personal and official credit the financial standing of the U. S. treasury, and advanced money from his own means to purchase war material and to organize troops. In a message to the legislature 1817 he recommended the abolition of slavery in N. Y.; and an act was passed accordingly, which went into effect 1827, July 4. He was elected vice-pres. of the United States 1816, and re-elected 1820—the two terms of Pres. Monroe.

TOMSK, *tŏmsk:* government in w. Siberia, bounded e. and n.e. by the govt. of Enisei or Yeneseisk, n.w. and w. by the govt. of Tobolsk; 331,159 sq. m. T., more than any other govt. in Siberia, abounds in lakes and rivers. Of the rivers, mostly flowing n. from the foot of the Altai Mts., the principal are the Ob, Tom, Chulim, and Irtish. The largest lakes, which are both sweet and brackish, are in the Barabinsky Steppes. The surface is greatly diversified: the Altai Mountains, with summits 10,000 to 11,000 ft. high, with lateral and parallel ranges, give an Alpine character to a great region. Elsewhere are elevated plateaus (3,000 to 4,000 ft.), and extensive lowlands. The climate is mild in the middle and s. districts, but severe in the north. Sandy and clayey soils prevail; but there are

patches of good mold on which abundant crops of grain of various kinds, as well as hemp, flax, and tobacco, are raised. The extensive mountain-slopes and plains are covered with luxuriant forests, in which the most common trees are the broad-leafed oak, the cedar, and the pitch-tree. The natural products are numerous. In the south and east parts, droves of wild horses and herds of horned cattle are a source of considerable wealth. But the mineral products of the country are its chief source of riches. Manufactures are not extensive; there is a large barter-trade with China, and the commerce of the country is maintained mostly by fairs. Pop. over 2,000,000.

TOMSK: trading-town of Siberia, cap. of the government of Tomsk, on the Tom, tributary of the Ob, 2,809 miles east of St. Petersburg, 2,377 miles from Moscow; lat. 56° 30′ n., long. 84° 58′ e. Situated on the great trading highway of Siberia, it is the seat of important transit-trade, chiefly with the Kalmucks and Mongols; but the goods that pass to and from Irkutsk also go by way of this town. There are more than 50 manufactories, chiefly for soap, leather, and distilled liquors, and the most important commercial article is furs. It is said to be the richest town in Siberia; and its commercial importance, its extent, and the number of its handsome buildings, are increasing annually. A great university is being instituted. Pop. 52,430.

TOM THUMB. See STRATTON, CHARLES SHERWOOD.

TOMTIT, n. *tŏm′tĭt* [*Tom,* abbreviation of Thomas, and *tit* (see TIT)]: a very little bird; the blue Tit (q.v.).

TOM-TOM, n. *tŏm′-tŏm′*. See TAM-TAM.

TON, n. *tŭn* [AS. *tunne,* a barrel: mid. L. *tunna*—from L. *tina,* a wine-vessel]: a weight of 20 cwt., equal to 2,240 lbs., called the *long ton* (the hundred-weight being reckoned at 112 lbs., as is customary in the United Kingdom), or equal to 2,000 lbs., called the *short ton* (the cwt. being reckoned at 100 lbs., as is customary in the United States): the *measurement ton* equals 40 cubic ft. TON′NAGE, n. *-nāj,* the carrying capacity of a ship, reckoned in tons of 100 cubic ft. (see TONNAGE, below): a duty or toll on vessels, or on goods carried on water; the shipping of any port or country regarded collectively.

TON, n. *tŏng* [F. *ton,* tone]: the prevailing fashion; high mode.

TON: common termination of place-names; a shortened form of *town,* from Middle English *-toun,* Anglo-Saxon *tun;* as Castle*ton,* Charles*ton.* A *tun* or *ton* was a place surrounded by a hedge, or rudely fortified by a palisade. Originally, it meant only a single homestead or farm, and this use is still common in Scotland. Similarly, the terminations *worth, fold, garth, burgh,* and others also convey the notion of inclosure, protection.—See I. Taylor's *Words and Places.*

TONAWANDA, *tŏn-a-wŏn'da:* village in Erie and Niagara cos., N. Y.; on the Niagara river and the Erie canal, and on the Erie and the New York Central and Hudson river railroads; 11 miles north of Buffalo, 11 miles southeast of Niagara Falls. It is connected with Buffalo and Niagara Falls by electric lines. Tonawanda is one of the largest lumber markets in the U. S., and on account of its excellent water power it has extensive manufacturing interests. It is located in a fertile agricultural region. The village contains a high school, public and parish schools, a public library, two banks, a weekly newspaper, natural and manufactured gas, and electric light plants. It has 60 manufacturing establishments, with a total capital of $1,540,789, including several foundries and flour mills, iron and steel works, and large beer brewery. The lumber industry has several planing, shingle, and saw mills. Pop. (1910) 8,290.

TONE, n. *tōn* [Gr. *tŏnos,* a stretching, a tone or note of the voice—from *teinō,* I stretch]: a sound of definite and assignable pitch produced (usually) by the periodic vibration of a sonorous body. *Tones* and *noises* comprise the two great classes of auditory sensation; *simple* tone, an unanalyzable tonal quality, generated, as a rule, by a single rate of vibration of approximately pendular form; *compound* or *musical* tone, or (in music) simple tone, the *note,* a single musical sound (as opposed to noise); the musical tone is composed of a number of simple tones (called *partials,* or *part tones*) whose pitches are indicated by simple vibration-ratios. The lowest, usually the strongest, partial is known as the *fundamental;* the other partials (*upper partials*) are called *overtones.* The composition of a note which comprises the first eight partials (say the note of a stringed instrument) is indicated by the following series of ratio-numbers:

1:2:3:4:5:6:7:8

If we assume that the note is *C* of the great octave (fundamental=66 vibrations in the second), we may write as follows the names and the vibration-rates of its partials:

C	c	g	c′	e′	g′	b′♭	c″
66	132	198	264	330	396	462	528

The clang-tint, or timbre or 'quality' of the note, depends, in the first place, upon the number and relative intensity of the constituent partials, and, in the second, upon the pitch, accompanying noises from the instrument, and the temporal course of the note; a particular inflection of the voice as modified by the feelings or passions; the particular sound or accent of the voice in speaking or reading; the state of the body in regard to the healthy performance of its animal functions; state of mind; character; tenor: in *paint.,* the harmony of the colors of a picture in light and shade: in *music,* an interval of sound; one of the larger intervals in the diatonic scale,

so called in distinction from the *Semitones* (q.v.), or smaller intervals. TONE, v. to utter in an affected tone; to tune. TON'ING, imp. TONED, pp. *tōnd:* ADJ. having a tone. TONAL, a. *tōn'ăl,* of or pertaining to tone. TONALITY, n. *tōn-ăl'ĭ-tĭ,* the peculiarity possessed by music in consequence of its being written in definite keys, conforming to certain definite tones and semitones of the diatonic scale. TONE'LESS, a. *-lĕs,* without tone; unmusical. TONE-SYLLABLE, an accented syllable. TONIC, a. *tŏn'ĭk,* increasing tension; giving or increasing strength; imparting vigor to the bodily system; strengthening (see TONICS): pertaining to tones or sounds: in *music,* denoting the key-note: N. a medicine or agent which imparts vigor and strength to the body; a stomachic: in *music,* the key-note or fundamental sound which generates all the rest (see KEY). TONICITY, n. *tŏn-ĭs'ĭ-tĭ,* a state of healthy tension of muscular fibres while at rest (see TONICITY, MUSCULAR). TONOMETER, n. *tō-nŏm'ĕ-tėr* [Gr. *tonos,* stretching, a tone; *metron,* a measure]: delicate apparatus for tuning musical instruments and for ascertaining the exact number of vibrations per second which produce a given tone. TONOM'ETRY, n. *-trĭ,* process of measuring vibrations of tones by means of a tonometer. TONING DOWN, subduing in color or shade; softening so as to remove all harshness.

TONE, *tōn,* THEOBALD WOLFE: Irish patriot; 1763, June 20—1798, June 20; b. Dublin. Having graduated at Trinity Coll., he was called to the bar 1789. He espoused the cause of the Rom. Catholics, and 1791 issued an appeal to Presbyterian Irishmen for justice to their Roman Catholic fellow-citizens. The same year he founded the first club of United Irishmen at Belfast, all of whose members were Protestants; similar clubs were organized by him throughout the north. Though himself a Protestant, he was elected secretary and agent of the Roman Catholic committee 1792. Having become implicated in a revolutionary conspiracy, he was permitted to leave Ireland, and came to the United States 1795, but soon sailed for France to enlist aid from the French directory for an insurrection in Ireland. In France, Tone held intimate relations with the highest men of the state; was commissioned *chef de brigade,* and was adjutant-general to Gen. Hoche in the ill-starred expedition to Bantry Bay, 1796. Returning to France, he again accompanied a feeble expedition to Ireland. Tone was taken prisoner after heroic resistance, and sentenced to death by court-martial at Dublin 1798; but he cut his throat in prison Nov. 11, the eve of the day set for his execution. His *Life,* written by himself, with a collection of his political writings, was published in Washington 1826.

TONGA BAY, *tŏng'ga:* small inlet on the e. coast of Africa, bounded north by Cape Delgado.

TON'GA ISLANDS AND TONGATABU, *tŏng-a-tâ'bô.* See FRIENDLY ISLANDS.

TONG-KING′, or TUNG-KING′. See TONQUIN; COCHIN CHINA.

TONGS, n. plu. *tŏngz* [Icel. *töng:* Dan. *tang;* Dut. *tang;* Ger. *zange,* tongs: Icel. *tangi,* the tang or part of a knife inclosed in the handle]: an instr. of metal, consisting of two long legs jointed at one end, for grasping and holding anything: the three chief forms are: (1) fire-tongs, hinged or pivoted like scissors near the upper end; (2) blacksmiths'-tongs, hinged or pivoted near the lower end; and (3) sugar-tongs, in which the two legs are joined together at the top by a spring.

TONGUE, n. *tŭng* [Icel. and Sw. *tunga;* Dut. *tong;* Ger. *zunge;* Gael. *teanga;* L. *lingua,* a tongue]: an instrument of speech, and the organ of state; speech; discourse; power of speech; voice; a language; anything resembling a tongue in its shape, use, or situation, as the *tongue* of a buckle or balance; a narrow piece of land projecting into the sea; the projection on the end or side of a board which fits into a groove; the clapper of a bell: V. to chide; to scold; to talk or prate much; in *music,* to modify notes with the tongue, as in flute-playing. TONGU′ING, imp. *-ĭng.* TONGUED, pp. *tŭngd:* ADJ. having a tongue. TONGUE′LESS, a. *-lĕs,* speechless; in *OE.,* unnamed; not spoken of. TONGUE-SHAPED, a. in the form of a tongue. TONGUE-TIED, a. having an impediment of speech arising from some defect in the tongue; unable to speak freely from whatever cause. TO HOLD THE TONGUE, to be silent.

TONGUE, THE: symmetrical muscular organ, extending from the hyoid bone backward and downward, to the lips in front, and occupying the buccal cavity. The superior surface, borders, and anterior third of the inferior surface, are free; while the remainder is attached to adjacent parts by the investing mucous membrane and subjacent structures. At certain points, this membrane, on leaving the tongue, forms distinct folds, containing fibrous or muscular tissue, which act to a certain extent as ligaments to the tongue. The most considerable of these folds is termed the *frænum* (or bridle) of the tongue, and connects its anterior free extremity with the lower jaw. It acts as a strong ligament, and limits the backward movement of the tip of the tongue. In rare cases, this ligament extends abnormally to the tip, so as to interfere with speech and mastication, and the child is said to be *tongue-tied;* the remedy for this is to snip the frænum sufficiently to liberate the anterior portion of the tongue. Other folds of mucous membrane (the *glosso-epiglottic* folds) pass from the base of the tongue to the epiglottis; while from the sides of the base, passing to the soft palate, are two folds on either side, known as the *pillars of the fauces.* See PALATE. The *superior surface* of the tongue is divided into two symmetrical lateral parts by a median longitudinal furrow, beginning at the tip, and extending back about two-thirds of the

tongue's length. For the various kinds of papillæ on their surface, see TASTE. At the back of the surface, just behind the circumvallate papillæ, are large mucous glands, extending into long and capacious canals, and helping to secrete the fluid that moistens the tongue. On the *inferior surface,* the longitudinal furrow, which extends from the tip to the frænum, is deeper than on the upper surface; on each side of it, veins are seen running

The upper surface of the Tongue, showing the Papillæ: 1, the raphe or mesial line; 2, 2, the lateral parts; 3 the tip, 4, 4, the sides or edges; 5, 5, the V-shaped mass of circumvallate papillæ; 6, the foramen cœcum; 7, the mucous glands at the root of the tongue; 8, the epiglottis; 9, 9, 9, the fræna epiglottides; 10, 10, the greater horns of the hyoid bone.—From Sœmmering.

forward; and immediately beneath the tip is a cluster of mucous glands, known as the glands of Nuck (their discoverer, 1690). The *posterior extremity,* or base, is flattened and extended laterally before it is inserted into the *hyoid bone* (known also as the *lingual* or *tongue bone*), which, with certain ligaments, must be regarded as the basis or framework of the tongue. The muscles of the tongue are usually divided into two groups—viz., the *extrinsic* muscles, which attach the tongue to certain fixed points external to it, and move it on them; and the *intrinsic* muscles, which pass from one part of the tongue to another, constitute its chief bulk, and move it on itself. These intrinsic muscular fibres run vertically, transversely, and longitudinally, and are so interlaced as mutually to support one another, and to act with the greatest advantage. By action of the various muscles, the upper surface of the tongue may be made concave

or convex, or may be pressed against the roof of the mouth; the tip may be protruded straight out or laterally, upward and downward, and to any recess (e.g., a hollow tooth) within the mouth where food might lodge; and the whole organ may be drawn back. The organ is freely supplied with blood, mainly by the lingual artery given off by the external carotid. Of the nerves, the glosso-pharyngeal and certain branches of the third division of the fifth nerve are concerned in the special sense of Taste (q.v.); other branches of the fifth nerve are concerned in ordinary sensation, while the hypoglossal nerve on each side is the motor nerve of the tongue.

The various uses or functions of the tongue cannot be understood without brief reference to its comparative anatomy. The tongue in mammals does not differ materially from that of man; but in general there is close coincidence in size and form between this organ and the lower jaw. In the rodents, the tongue has a wedge-like shape. In the giraffe, and the ant-eater, the tongue is much prolonged, being an important prehensile organ in the former; while in the latter, it is driven into ant-hills, and the victims are secured by its viscid secretion. In the feline races, the conical papillæ are converted into recurved spines of great size and strength, which the animal uses in scraping bones and in combing its fur. Except in mammals, the tongue is probably not an organ of taste. For a good description of the tongue in birds, reptiles, and fishes, see Prof. Owen's *Anatomy of the Vertebrates*, I., II. Among the Mollusca, the Gasteropoda are provided with a very singular apparatus known as the tongue, consisting generally of a thin membrane, long and narrow, and rolled, except at its anterior extremity, into a tube. This membrane is covered on its upper surface with transverse rows of minute teeth, or more commonly with plates having tooth-like siliceous projections. These teeth present a great variety of patterns, which are constant in the different genera, and even characterize the species. Two eminent naturalists have independently made the teeth of the Mollusca a basis of classification. The Articulata do not present anything like a true tongue, though in insects a certain oval appendage is described as a *lingua*.

The functions of the tongue are gustation, prehension (in man and monkeys this function is supplied by the hand), mastication, insalivation, deglutition, and speech; to which may be added, spitting and whistling, and in the case of the Gasteropoda, the triturition of the food.

Among *Diseases* of the tongue is INFLAMMATION or GLOSSITIS: the most marked characteristics of this affection are great swelling, tenderness, and difficulty in speaking and swallowing. It rarely occurs as an idiopathic or spontaneous affection, but often accompanies severe salivation. It must be treated by purgatives and low diet, and by gargling, as in ordinary Salivation. Incisions are sometimes useful, both to relieve tension, and

by the depletion that ensues. Cases sometimes occur in which the tongue suddenly enlarges to immense size, so as almost to cause suffocation, without any true sign of inflammation.

Hypertrophy, or *persistent enlargement* of the tongue, sometimes results from an imperfectly cured case of inflammation; but is probably in most cases congenital, though perhaps not noticed for a year or two. One of the most common forms of disease of the tongue is *ulceration,* which may arise (1) from irritation by a decayed tooth with a sharp jagged edge; (2) from constitutional syphilis; or (3) from disordered condition of the digestive organs. In the first case, the cavity of the tooth must be filled so that there are no sharp edges; in the second, the ordinary treatment of this disease must be instituted; and in the third, the complaint generally yields to regulation of the diet and of the digestive organs. *Cancer* of the tongue occurs either in the hard or in the epithelial variety. There is a popular belief that this disease may be excited by the irritation caused by a broken tooth, or by smoking a clay pipe; but on comparing the prodigious numbers of jagged teeth and of clay pipes with the rare cases of cancer of the tongue, we must reject this hypothesis. All that such sources of irritation can effect is to determine the exact seat of development of cancer in persons predisposed to it. The only treatment which can be adopted with any chance of success is full and early extirpation. The tongue may be the seat of various forms of benign tumors, the treatment of which will vary according to the cause and the nature of the tumor, but in many cases removal is necessary. Leucoplakia is an affection marked by the formation of whitish patches on the tongue, due to a horny degeneration of the epithelium. In geographical tongue there are patches in which the epilthelium has fallen away, the edges of the patches being raised above the surface, the varied and uneven contour giving an appearance resembling a map, whence the name.

TONGUES, GIFT OF: a peculiar power given to the apostles and other Christians in the first ages of the church. The main passages in the New Test. relating to it are Acts ii. 3-21; I Cor. xii, 10, 28; xiii. 1, and particularly xiv. Allusions to it are in Mark xvi. 17; Acts x. 46; xix. 6. The only allusion to the possession of the gift in later times is in Irenæus, *Adv. Hær.* vi. 6: 'We have many brethren in the church having prophetical gifts, and by the Spirit speaking in all kinds of languages.' From these data, the following conclusions have been drawn by one of the most scholarly and intelligent expositors of the Epistles to the Corinthians. The gift in question is represented as something entirely new in the apostolical age: 'They shall speak with new tongues'—Mark xvi. 17. The effect on the spectators at the day of Pentecost is of universal astonishment. It is represented as a special mark of conversion, immediately preceding

or following baptism. It is a gift 'of the Spirit': 'They began to speak with other tongues, as the Spirit gave them utterance'—Acts ii. 4. It was, moreover, closely connected with the gift of 'prophesying'—I Cor. xii. 10, 28; xiv. 1-6. It appears to be distinguished from prophesying by consisting not of direct warning, exhortation, or prediction; but of thanksgiving, praise, prayer, singing, and other expressions of devotion. It was an utterance of the heart and feelings, rather than of the understanding, so that the actual words and meaning were generally untintelligible to the bystanders, and sometimes to the speakers themselves: 'He that speaketh with a tongue speaketh *not unto men, but unto God;* for no man understandeth; but in the Spirit he speaketh mysteries'—I Cor. xiv. 2, 4, etc. So far, the account of the gift seems intelligible. It was, as Dean Stanley says, 'a trance or ecstasy, which in moments of great religious fervor, especially at the moment of conversion, seized the early believers; and this fervor vented itself in expressions of thanksgiving, in fragments of psalmody or hymnody, and prayer, which to the speaker himself conveyed an irresistible sense of communion with God; and to the bystanders, an impression of some extraordinary manifestation of power, but not necessarily any instruction or teaching, and sometimes even having the appearance of wild excitement, like that of madness or intoxication.' The special difficulty, however, remains, viz., as to the character of intelligibility, which, on one prominent occasion, seems to have belonged to the gift. *Glōssa,* or the word translated 'tongue,' does not necessarily imply a distinct language of a people; this is usually expressed in the New Test. by *dialektos.* But in the description in Acts ii. 6, 8, it is expressly said: 'Every man heard them speaking in his *own language*' (*tē idia dialektō*). 'How hear we every man in *our own language*' (the same phrase in the original) 'wherein we were born?' The plain meaning of this account seems to be, that the gift of tongues, on this occasion at least, assumed the form of intelligible communications in foreign languages. But there is no evidence that the apostles then, or at any subsequent time, had the ability, supernaturally imparted, of speaking a variety of languages, with a view to the more adequate discharge of their apostolic functions, as has sometimes been inferred from the passages in the Acts. 'Probably,' it has been said, 'in no age of the world has such a gift been less needed. The chief sphere of the apostles must have been within the Roman empire, and within that sphere, Greek or Latin, especially Greek, must have been everywhere understood. Even on the day of Pentecost, the speech of Peter, by which the first great conversion of a multitude was effected, seems to have been in Greek, which probably all the nations assembled would sufficiently understand; and the speaking of foreign dialects is nowhere alluded to by him as any part of

the event which he is vindicating and describing.'—Dean Stanley (*Corinth.* p. 250).

TONIC'ITY, MUSCULAR: state of healthy tension of muscular fibres when at rest. The contractility of muscles shows itself under two distinct forms—*Irritability* and *Tonicity*, which are distinct alike in the mode of their action and in the conditions requisite for their exhibition. Irritability is most manifest in the voluntary muscles and in the heart, which, when in activity, exhibit powerful contractions alternating with relaxation; while tonicity is shown in a moderate and permanent contraction. Like irritability, it is an inherent property of muscular tissue during life. 'It manifests itself,' says Dr. Carpenter, 'in the retraction which takes place in the ends of a living muscle when it is divided (as is seen in amputation), this retraction being permanent. But its effects are much more remarkable in the non-striated form of muscular fibre; and are particularly evident in the contractile coat of the arteries, causing the almost entire obliteration of their tubes, when they are no longer distended with blood.' It is to the moderate action of the tonicity of arteries that their contraction on the current of blood passing through them is due. If the tonicity be excessive, the pulse is hard and wiry; but if it be deficient, the pulse is very compressible, though bounding, and the flow of blood is retarded. *Cold* is the most efficient agent in inducing tonic contraction; while the application of moderate warmth causes relaxation of this contraction: thus, cold and heat are of extreme value as remedial agents, when the tonicity of the blood-vessels is deficient or excessive.

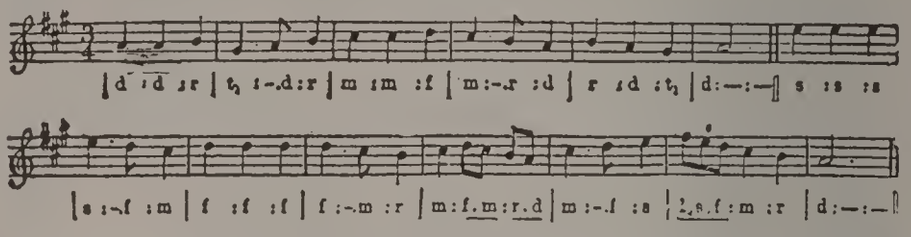
TON'ICS, in Medicine: remedies which, in cases of lack of *tone* or *tonicity* in the muscular fibres, are employed to restore strength and vigor to the system. Tonics, to a certain degree, are stimulants; but while the latter produce rapid but transitory excitement, the former slowly induce a certain degree of excitement, and the effect is permanent. Most tonics, in which category we must place the shower-bath, cold sea-bathing, open-air exercise, friction, etc., as well as actual medicines of this class, act primarily through the nervous system (iron being, perhaps, the only exception); and secondarily produce their effects on the muscular system at large. It is not only in general muscular debility that tonics are to be employed, but in all the numerous disorders which follow in its train, and in all cases of general muscular or nervous debility. Among the chief medicines of this class are the dilute hydrochloric, nitric, nitro-hydrochloric, and phosphoric acids; various salts of bismuth, copper, iron, silver, and zinc; various kinds of cinchona bark, with their alkaloids and their salts, calumba, gentian, quassia, and traxacum. Nux vomica and its alkaloid strychnine, when given in very small doses, have a well-marked tonic action.

TONIC SOL-FA, *tŏn'ĭk sōl-fâ':* form of musical notation in which the staff with its lines and spaces is dispensed with. Various attempts have been made to introduce such a system. Jean Jacques Rousseau suggested, but afterward discarded, a notation where the notes of the scale were indicated by the Arabic numerals. A system similar to Rousseau's in its leading features, called the Tonic Sol-fa, has, through the influence of its principal promoter, the Rev. John Curwen (who obtained his main principles from the writings and practice of Miss Glover of Norwich), been brought into use to a considerable extent in singing-schools in Great Britain and the United States. It proceeds on the principle of giving the chief prominence to the fact that there is in reality but one scale in music, which is raised or lowered according to the pitch of the key. The seven notes of the diatonic scale are represented by the Solfeggio (q.v.) syllables, or rather Miss Glover's modification of them—*Doh, Ray, Me, Fah, Soh, Lah, Te; Doh* standing for the keynote in whatever key the music is written. In the early exercises, the pupils are accustomed to a scale or diagram, called the Modulator, representing pictorially the exact intervals of a key, with the semitones in their proper places. In written music, only the initial letters of the solfeggio syllables are used—d, r, m, f, s, l, t; the higher octaves of a given note being distinguished by a ^{1} above, as d^1, r^1; and the lower by a $_1$ or $_2$ below, m_1, m_2. The name of the key is prefixed to a tune as its signature, as 'Key A,' 'Key B flat'—the keynote being, in all the major keys, *doh.* To indicate rhythm, a perpendicular line | precedes the stronger or louder accent, a colon : the softer accent, and where necessary, a shorter perpendicular line | the accent of medium force. Preparatory to writing the notes, the accent-marks are placed at equal distances along the page—thus, | : | : or : | : : | : : | : or | : | : | : | : A note immediately following an accent-mark is supposed to occupy the time from that accent to the next—thus, | d : d : d | d : d : d | d, or | d : r | m : d. A horizontal line indicates the continuance of the previous note through another *aliquot* (the term used by Curwen for the distance of time between any accent and the next)—thus, d : — | d : d. A dot divides an aliquot into equal subdivisions, d : m.r | d. A dot after a mark of continuance indicates that the pre-

Modulator.

vious note is to be continued through half that aliquot—thus, | d :-. f | m : d. A comma indicates that the note preceding it fills a quarter of the time from one accent to the next—thus, | d : r.m,f | ; a dot and comma together, three-quarters—thus, | f.,m : r.,d. An inverted comma ‘ is used to denote that the note preceding it fills one-third of the time from one accent to the next—thus, : d | s : l,‘s,‘f | m : r | d. An aliquot or part of it unfilled, indicates a rest or pause of the voice. A line below two or more notes signifies that they are to be sung to the same syllable. Subjoined is an example of the tonic sol-fa shown alongside of the ordinary notation:

KEY A. AMERICA.



In modulating into a new key, the note from which the transition is taken is indicated by a combination of the syllabic name which it has in the old key with that which it has in the new—*me lah*, for example, being conjoined into *m'lah;* and in writing this note, the initial letter of its syllable, as a member of the old key, is placed in small size before and above the initial of the syllable of the new, as ^{m}l, ^{d}s. In the case, however, of an accidental, where the transition is but momentary, a sharpened note changes its syllabic vowel into *e*, and a flattened note into *aw*, spelled *a*, as *fah, fe; soh, se; te, ta*. In the minor mode, *lah* is the key-note; the sharp sixth is called *bah*, and the sharp seventh *se*. The signature of the key of A minor is ‘Key C, minor mode.’

For a full explanation of this system, see Curwen's *Grammar of Vocal Music*, or the periodical called the *Sol-fa Reporter*. The advocates of this notation maintain that it possesses advantages over the common system, particularly from the distinctness with which it indicates the key-note and the position of the semitones; the cheapness with which it is printed; and the manner in which, they say, it develops the proper mental effects of notes in key-relationship, and employs them in teaching. It has, however, been objected to by some, for its withdrawal of the direct indication of pitch to the eye which exists in the common notation, for its limited applicability to instrumental music, and for its acquirement not being, like that of the ordinary notation, an introduction to the world of musical literature.

TONIC, TONICITY: see under TONE.

TO-NIGHT, n. ad. *tû-nīt'* [*to*, on, and *night*] the night at the close of the present day.

TONING, n. *tōn'ĭng:* the treatment of a positive photographic print with a weak solution of gold, in connection with other modifying chemical salts, by which the whole or a portion of metallic silver is replaced by metallic gold in fine division: the effect is to give permanency to the print, and to subdue and modify the disagreeable color, and substitute various shades of purple, black, blue, brown, and gray.

TONITE, n. *tōn'īt* [L. *tono*, I thunder]: a powerful explosive agent, prepared from gun-cotton.

TONKA-BEAN, *tŏng'kă-*, or TONQUIN-BEAN, *tŏng'kwĭn-* [F. *tonca*]: the fruit or seed of a shrubby plant of Guiana, possessing a very pleasant smell, used in the scenting of snuff; the plant *Dipterix odorāta*, ord. *Legumĭnōsæ*, subord. *Papilĭonācĕæ*, having pinnated leaves and axillary racemes of purplish flowers. The fruit is an oblong, dry, fibrous drupe, containing a single seed, which has a strong agreeable odor, due to the Coumarine (q.v.) which it contains, and which is sometimes found crystallized between the cotyledons. Tonka-beans are used for flavoring snuff, for which purpose one is carried in the snuff-box; and are put among clothes, to preserve them from insects and to communicate an agreeable odor.

TONKIN': see TONQUIN: COCHIN CHINA.

TON'NAGE: capacity of a ship expressed in register tons of 100 cubic ft., the 'register ton' being the unit on which port and other charges are levied. Prior to 1865 the rule followed in the United States in computing the tonnage of vessels was to multiply the extreme length (less one-third the breadth) by the breadth and the depth respectively, and then to divide by 95. In 1865 the British system (with modifications) was adopted. This, which dates from 1835 (though not perfected until 1854 and later), superseded in the United Kingdom a very imperfect system (established 1719) in which the depth was *assumed* to be equal to the breadth, the formula being:

$$\frac{\text{breadth} \times \text{breadth} \times \text{length}}{94} = \text{tonnage.}$$

Traders (desirous to save tonnage dues) naturally built their ships with as little beam as possible, producing deep wooden boxes capable of carrying a maximum of cargo with a minimum of beam, but highly dangerous in stormy weather. In the new system, however, actual measurements of depth are made at certain intervals along what is called the 'tonnage deck' (i.e., the second deck from below in all vessels of more than two decks and the upper deck in all other vessels), the number of which depends on the total length of the vessel as measured along this deck. With a length of 50 ft., six depth-measurements are made (in the British system only 4); with a length of 50 to 100 ft., eight depth-measurements are made; and so on through the six classes (5 in the Brit. system) into which vessels are divided according to length. At each of these points, 'transverse areas' are computed and set down in ft. and decimals of a ft. These, except the first and last, are then

multiplied by certain numbers (4 for the even numbers, counting from the bow, and 2 for the odd), the sum of the products added to the sum of the first and last transverse areas (if any); the total is multiplied by one-third the common distance between areas, and then divided by 100. This represents 'the register tonnage below the tonnage deck.' To obtain the 'gross tonnage,' it is necessary to add the cubic content of all spaces above the tonnage deck, the poop (if any), deck-houses, etc. This is ascertained by multiplying the horizontal area of such spaces by the mean height, and dividing by 100, as before. In steamships it is customary to deduct the cubic content of the engine-room, and the space occupied by the screw-shaft, etc.

Displacement tonnage is found in the same way as register tonnage, except that measurements are made not along and from the tonnage deck, but from the load-water-line, and the final cubic content is divided by 35.

The Brit. system has also been adopted by Denmark, Austria-Hungary, Germany, France, Italy, Spain, Sweden, the Netherlands, Norway, Greece, Russia, Finland, Hayti, Belgium, Japan, etc., generally with slight differences, especially in the rules for deduction of engine-room in steamships; and was adopted in its essentials by the international congress at Constantinople 1873, in connection with fixing the basis for Suez canal charges.

TON'NAGE (properly TUNNAGE) AND POUNDAGE: tax of so much per *tun*, formerly levied on all wine imported into England, and of 12 pence per lb. on all merchandise imported or exported; abolished 1787.

TONQUIN, *tŏn-kēn'* (better *Tong-king*:) region in the n.e. of the Indo-Chinese peninsula, bordering on s. China. It is mountainous in the n.; but the greater part of its area is the fertile basin of the important river Song-ka or Songcoi. Formerly an independent state, it has been for more than one hundred years a dependency of Anam (see COCHIN CHINA), forming its richest province. The French, moved by the hope of finding access into China by the head-streams of the Song-ka, have repeatedly intervened in the affairs of T.; and 1874 forced the Anamese to recognize their protectorate over T., and open its ports to trade. To enforce this claim, France occupied the delta of the Song-ka 1883, but met with difficulties; China still making opposition, even after a treaty had been signed 1884, recognizing Anam as practically a vassal-state of France. The cap. of T. is Hanoi, Kesho, or Cachao (q.v.).—The *Gulf of T.*, between T. and the island of Hainan, is 300 m. long by 150 m. wide.

TONQUIN-BEAN: see TONKA-BEAN.

TONSIL, n. *tŏn'sĭl* [L. *tonsil'læ*, the tonsils]: one of two oblong glands situated on each side of the fauces, at the base of the tongue (see PALATE). TON'SILLAR, a. *-sĭl-lĕr*, or TON'SILAR, a. *-sĭ-lĕr*, pertaining to the tonsils. TON'SILLI'TIS, n. *-sĭl-lī'tĭs*, inflammation of the tonsils; a form of sore throat (see QUINSY). TON'SILLIT'IC, a. *-lĭt'ĭk*, or TON'SILIT'IC, a. *-ĭt'ĭk*, related to or connected with the tonsils.

TONSORIAL, a. *tŏn-sō′rĭ-ăl* [L. *tonsorĭus*, of or belonging to shaving—from *tonsor*, a barber—from *tondĕrĕ*, to shave]: of or pertaining to a barber or shaving. TON′SILE, a. *-sĭl*, that may be clipped or shorn. TONSURE, n. *tŏn′shûr* [F. *tonsure*—from L. *tonsūra*, a shearing, a clipping: It. *tonsura*]: act of clipping the hair or of shaving the crown of the head; state of being shorn; in the *Rom. Cath. Chh.*, the first ceremony performed in dedicating a person to the priesthood; the corona or crown on the head of a priest or monk, formed by clipping or shaving the hair, and varying in size according to the order and rank of the person (see below). TON′SURED, a. *-shûrd*, shaven on the crown; shorn; bald.

TON′SURE: religious observance in the Rom. Cath. and oriental churches, which consists in shaving or cutting the hair, as a sign of the dedication of the person to the special service of God, and commonly to the public ministry of religion. The usage was not prevalent in the early ages of the church; and seems to have arisen in reference to the monastic rather than the clerical life. Paulinus of Nola, end of the 4th or beginning of the 5th c., alludes to it as then in use among the western monks; and it speedily passed from them to the clergy, the crown-like figure being regarded partly as a symbol of Christ's crown of thorns, partly as an emblem of the 'royal priestnood' of the Christian dispensation. The form of the T. differed in different churches. That of the Roman Church, called 'the T. of Peter,' consisted in shaving the crown as well as the back of the head, so that there remained a circular ring or 'crown' of hair: this was the usage in Italy, Gaul, and Spain. In the 'Scottish (or Irish) Tonsure,' in use in Ireland, in n. Britain, and in those parts of Germany in which the Irish missionaries had preached, the entire front of the head was shaved, leaving the front bare as far back as the line from ear to ear: this T. was called 'the Tonsure of James,' and sometimes of 'Simon the Magician.' The Greeks and other orientals shaved *the entire head.* The supposed derivation of the Irish form of T. from apostolic times led to its being held both in Ireland and in Britain, as well as other churches of Irish foundation, to be of vital importance, insomuch that the introduction of the Roman form was almost the occasion of a schism. Originally the T. was merely a part of the ceremonial of initiation in orders, and performed only in the act of administering the higher order; but about the 7th c. it became an independent ceremonial; and a question has been raised whether it is to be considered as itself an order, and to be added to the list of what are called the 'minor Orders' (q.v.). The now received opinion of Rom. Cath. writers is that T. is not an 'order,' but only a 'preparation for orders.'—See Wetzer and Welte's *Kirchen-lexicon*, art. 'Tonsur.'

TONTINE, n. *tŏn-tēn'* [F. *tontine:* so called from an Italian, Lorenzo *Tonti*, who originated the scheme in the 17th century]: an annuity of survivorship; an annuity shared equally by several individuals, the equal share being increased by the death of successive annuitants until the whole goes to the last survivor, or to the last two or three, according to the original agreement: see INSURANCE—*Life Insurance.*

TONTY, *tŏn'tē*, Chevalier HENRY DE: soldier and explorer: about 1650–1704, Sep.; b. Gaeta, Italy; son of Lorenzo T., inventor of the TONTINE (q.v.) system of annuities. T. was a soldier in early youth, and lost a hand, which was replaced by an iron one. He accompanied LA SALLE (q.v.) to America 1678; built forts on the frontier against the Iroquois; wintered at Green Bay, Mich., 1681; descended the Mississippi with La Salle 1682; returning to Mackinaw for aid to La Salle, he again descended the Mississippi, and found La Salle dead. T. died where Mobile now stands.

TOO, ad. *tô* [AS. *tó*, denoting an increase or addition (see To)]: more than enough; over and above; in addition; likewise; also.

TOOK, v. *tûk:* pt. of TAKE (q.v.).

TOOKE, *tûk*, JOHN HORNE: etymologist and political adventurer: 1736, June 25—1812, Mar. 18; b. London; son of John Horne, a London poulterer, or, as the son when at Eton School chose to express it to his aristocratic companions 'Turkey merchant.' He added to his name (Horne) that of TOOKE, 1782. He was educated at Westminster and Eton; and afterward at St. John's College, Cambridge, where he took the degree B.A. 1758. His strong desire was to study law; but, according to his father's wish, he took orders as an Anglican priest, and 1760 became curate at New Brentford. It was an unfortunate position, and appears to have impaired the honesty of his character. In a letter to John Wilkes (q.v.) he writes: 'It is true I have suffered the infectious hand of a bishop to be waved over me; whose imposition, like the sop given to Judas, is only a signal for the devil to enter; but I hope I have escaped the contagion.' When Wilkes (whose acquaintance Horne had made during a trip to Paris) stood as candidate for the county of Middlesex, T. zealously aided him, pledging his credit for Wilkes's expenses; but he afterward quarrelled with his dubious associate, and 1770–1 the two had a rasping epistolary controversy, to the gratification of their enemies. Horne still, however, continued to meddle in political affairs, and even ventured to encounter (not without success) the formidable Junius. In 1773 he resigned his living at New Brentford, and again turned to the study of law, for which he had a natural fitness. About this time, he rendered to a friend, William Tooke, of Purley in Surrey, important services—by a bold public attack preventing the passing of an act in parliament to Tooke's injury in regard to an estate which included Purley Lodge. In return, Tooke

designed to make him his heir, but eventually left him only a legacy of £500. Altogether, however, he is said to have received from this gentleman about £8,000; and, in consequence, adopted (1782) the surname by which he is known. In 1775 he was fined and imprisoned in the king's bench for signing an advertisement accusing the king's troops of barbarously murdering the Americans at Lexington and Concord. While in prison, he penned his celebrated *Letter to Mr. Dunning*, in which are the germs of his *Diversions of Purley*. It excited great attention, and even Dr. Johnson, who detested the writer's political sentiments, expressed his intention—should he publish a new edition of his *Dictionary*—to adopt several of the 'dog's' etymologies. On his release from confinement, T. tried to gain admission to the bar, but was refused, on the ground that his clerical orders were indelible. He reverted to political writing, at once the pleasure and the poison of his life; and in a *Letter on Parliamentary Reform* advocated universal suffrage. In the struggle between Pitt and Fox, he pamphleteered on the side of Pitt; but soon came to hate Pitt too, as he had learned to hate most other public men. In 1786 appeared H.-T.'s famous *Epea Pteroenta, or the Diversions of Purley*, a work on the analysis and etymology of English words, which has given fame to his friend's estate, inasmuch as, amid much that is erroneous in principle and detail, it contains much more that is acute, original, and true. In particular, he has demonstrated, according to a *Quarterly Review* (No. 14), that 'all words, even those that are expressions of the nicest operations of our minds, were originally borrowed from the objects of external perception' (see PHILOLOGY). But his passion for politics soon drew him from the calm pursuit of literature into the vortex of public life. In 1790, and again in 1796, H.-T. stood as candidate for Westminster, and made most able and forcible speeches from the hustings; but was unsuccessful. Meanwhile, 1794, May, he had been arrested for high treason and conveyed to the Tower; and on trial had been instantly acquitted by the jury. At length, 1801, this great enemy of rotten boroughs entered parliament for the most notorious rotten borough in England—Old Sarum; but at the end of one parliament he was excluded by an act which had been passed for the purpose, declaring ineligible for the house of commons all persons in holy orders. He died at Wimbledon. H.-T. was never married, but had several natural children, to whom he left his property. The best ed. of the *Diversions of Purley* is that of Taylor (Lond. 1840).

TOOL, n. *tôl* [Icel. *tól*, tools: AS. *tól*, a tool]: an instr. or aid for any manual operation; a person used by another as an instr. to accomplish certain ends; a hireling; a figure or ornament impressed on cover of a book by means of a stamp or 'tool:' V. to shape or fashion with a tool: in *slang*, to drive, as a coach. TOOL'ING, imp.: N. workmanship performed with a tool, as in book-binding. TOOLED, pp. *tôld*. TOOLED-ASHLER or -ASHLAR, n. *tôld-ăsh'lêr*, in

mason., ashlar with its face chisel-dressed into parallel ridges and hollows.

TOOM, n. *tôm* [Sw. and Dan. *tom;* Icel. *tómr*, empty, unoccupied]: in *Scot.*, a place where rubbish may be emptied or poured out; a dump: ADJ. empty: V. to empty: see TEEM 2.

TOOMBS, *tômbz*, ROBERT: statesman: 1810, July 2—1885, Dec. 15; b. Wilkes co., Ga. He was educated in the Univ. of Virginia and in Union Coll., and was admitted to the bar 1830, while still a minor. He quickly rose to the highest rank in the legal profession of Ga. In the war with the Creeks, 1836, he was capt.; was member of the Ga. legislature 1837–40, and a leader in the whig party. He was a supporter of Gen. William H. Harrison in the presidential canvass of 1840, and of Henry Clay in that of 1844. Elected representative in congress 1844, he was member of the house for 4 successive terms, and 1853–61 was U. S. senator. In the house he powerfully promoted the passage of the Mo. compromise measure: in the senate he was uncompromising in his advocacy of the doctrine of state rights, and insisted on the necessity of maintaining and extending slavery. On the election of Abraham Lincoln, T. made a tour of his state, stirring up the people to revolt. He was member of the first Confederate congress, then was Confederate sec. of state, but resigned to take a brigadiership in the army. After active service in the field, he resigned his commission after the battle of Antietam, and returned to Ga. He went abroad at the close of the war, but returned to Ga. 1867, resuming law practice. As advocate of the state of Ga., he compelled the railroads to submit to the general tax law.

TOOMBUDRA, *tôm-bŭd'râ* (correctly, TUNGA-BHADRO): river, important tributary of the Kistnah or Krishna, rising in s.w. Maisur (Mysore), and after a n.e. course of 350 to 400 m. joining the Kistnah 25 m. below Karnul.

TOON, *tôn*, or TOONA, *tô'na* (*Cedrela Toona*): tree of nat. order *Cedrelaceæ*, one of the largest timber-trees of India. Dr. Hooker mentions one which he measured, 30 ft. in girth at five ft. above the ground. The leaves are pinnate, flowers small, in panicles, with honey-like odor, petals erect and approaching each other so as to form a sort of tube. The tree grows at the height of 4,000 ft. in the Himalaya Mts., and is found to the furthest s. of the E. Indies. It is sometimes called *Bastard Cedar*. The wood is soft, but is used for furniture. The bark is a powerful astringent, and is used in dysentery, diarrhea, etc.

TOONGROO': see DHOORCATEE.

TOORKISTAN', or TURKISTAN': see TURKESTAN.

TOOT, v. *tôt* [O. Dut. *tuyten;* Dan. *tude*, to blow a horn: Icel. *thjota*, to resound as the wind]: to blow a horn, flute, or other wind-instrument with little short blasts: N. a blast on the horn. TOOT'ING, imp. TOOT'ED, pp. TOOT'ER, n. *-ẽr*, one who toots or plays on a pipe or horn.

ROBERT TOOMBS.

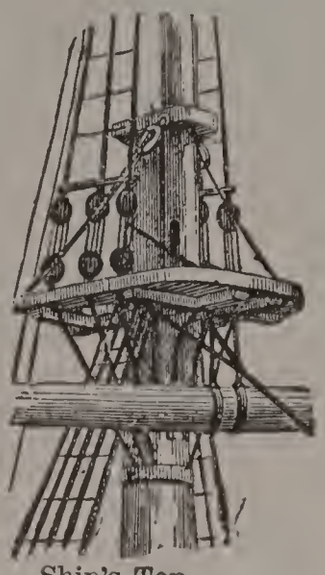
TOOTH, n. *tôth;* TEETH (q.v.), n. plu. *tēth* [Goth. *tunthus;* Ger. *zahn;* Dan. and Dut. *tand;* Icel. *tönn*, a tooth]: one of the bony processes growing in the jaws, used as the instrs. of biting and chewing (see TEETH); something pointed; a prong; one of the projections on the rim of a wheel by which it catches the prominent parts of another wheel or body; taste; palate: V. to furnish with teeth; to indent; to jag; to lock into each other. TOOTH'ING, imp.: N. in *building*, the irregular stones or bricks left jutting out at the end of a wall or building to form a union for any additional building. TOOTHED, pp. *tôtht:* ADJ. having teeth or jags. TOOTH'FUL, n. *-fûl*, a small quantity: ADJ. in *OE.*, palatable. TOOTH'LESS, a. *-lĕs*, without teeth. TOOTH'ACHE, n. *-āk*, severe pain in one or more of the Teeth (q.v.). TOOTH'SOME, a. *-sŭm*, grateful to the taste. TOOTH'SOMENESS, n. *-nĕs*, the quality of being toothsome. TOOTH'Y, a. *-ĭ*, having teeth. TEETH ON EDGE, a disagreeable tingling sensation in the teeth, caused by grating sounds, or by the actual or imaginary contact of certain substances with the teeth, as an acrid or a woolen substance. TOOTH-PICK, or TOOTH-PICKER, a small article for picking out particles of food that have lodged between the teeth. TOOTHWORT, a parasitic plant, the *Lathræa squamārĭa*, ord. *Orobanchăcĕæ*. TOOTH AND NAIL, with one's utmost power; by all possible means. IN THE TEETH, in direct opposition. TO THE TEETH, directly to one's face. TO CAST IN THE TEETH, to retort reproachfully. TO SHOW THE TEETH, to threaten. IN SPITE OF THE TEETH, notwithstanding threats expressed; in defiance of opposition.

TOOTH'ACHE-TREE: see ARALIA: XANTHOXYLUM.

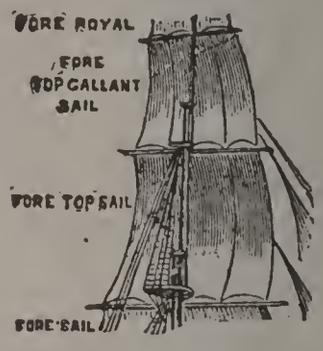
TOOTH'-ORNAMENT: architectural decoration much used in the Early English style.

TOP, n. *tŏp* [Icel. *toppr*, the top or summit: Sw. *topp*, a summit: Low Ger. *topp;* Dut. *top*, summit: Dan. *top*, a tuft, a top: Ger. *zopf*, a tuft, top of a tree]: the highest or uppermost part of anything; the surface; the highest place, person, or rank; the chief; the crown of the head: among *seamen*, small platform at the head of each lower mast. It is supported on the trestle-trees and cross-trees, and serves to give a wider base to the topmast shrouds. It is used also for working the upper sails. In a well-ordered ship there is a captain and crew for each top: ADJ. situated at the top or highest part: V. to rise to the highest place; to rise above others; to excel; to rise over and above; to cover on the top; to crop; to take off the upper part. TOP'PING, imp.: ADJ. fine; gallant; great; predominating. TOPPED, pp. *tŏpt:* ADJ. surpassed; having the top cut off. TOP'FUL, a. *-fûl*, full to the brim. TOP-ARMOR, in a *ship*, a railing on the top protected with netting. TOP-BOOTS, boots with an ornamental band of bright-colored leather on the upper parts; also called TOPS. TOPCOAT, a coat worn over the ordinary dress by men; an overcoat. TOP-DRAINING, surface-draining. TOP-DRESSING, manure laid on the surface without being turned or plowed in. TOPGALLANT, a. highest; elevated; that is above the topmast (see TOPGALLANTMAST). TOP-HEAVY, a. too heavy on the top.

tipsy. TOP-KNOT, a knot worn by women on the top of the head: a small fish (*Rhombus hirtus* and *R. punctatus*) of the same genus as the Turbot (q.v.) and Brill (q.v.—see also below). TOPMAST, the second mast above the deck, next the lower mast. TOP'MOST, a. *-mōst.* the uppermost;



Ship's Top.



Foremast, showing Top-gallant.

the highest. TOP-PROUD, in *OE.*, proud in the highest degree. TOP-SAIL, the sail extended across the topmast. TOP-TIMBERS, pieces in the ribs of a ship's side, which are next above the futtocks. TOP OF THE TREE, a high or the highest position in anything. TO THE TOP OF HIS BENT, as much as he could desire (see BENT 1).

TOP, n. *tŏp* [Dut. *top;* Ger. *topf*, a spinning-top, so called from tapering to a *top* or point (see TOP 1)]: a child's toy, of a pear shape, which is made to spin on its point by means of a long string; also with a blunter point made to spin for any length of time by the continual application of a whip of several loose strands.

TOPAZ, n. *tō'păz* [F. *topaze*—from L. *topāzus;* Gr. *topāzŏs*]: one of the precious stones, occurring in finely striated crystals, transparent, of various colors, or colorless, most frequently yellow, and harder than quartz. TOPAZOLITE, n. *tō-păz'ō-līt* [Gr. *lithos*, a stone]: pale-yellow, nearly transparent, variety of garnet. TOPAZ-ROCK, granular slaty mixture of quartz, schorl, and topaz.—*Topaz* is a mineral, ranked by mineralogists among Gems (q.v.), and whose finer varieties are much valued for their lustre and their beauty of color. It is composed chiefly of alumina and silica, the former, in general, more than 50 per cent. of the whole, with fluoric acid and usually a little oxide of iron. It is found generally in primitive rocks, and in many parts of the world. A crystal 19 ounces in weight was found in the Cairngorm Mountains in Aberdeenshire, Scotland. Fine topazes are found in Ceylon, but those most prized by jewellers are generally from Brazil. The finer varieties are found usually either crystallized or as small rolled masses which may have been formed from crystals, in alluvial soil. T. is colorless, or red, blue, green,

or yellow, in great variety of shades. Its crystals are rhombic prisms, generally terminated by four-sided pyramids, but often variously bevelled and acuminated. The prisms are finely striated. The cleavage parallel to the base of the prism is easy. The specific gravity is about 3·5. The lustre is vitreous. T. is translucent or almost transparent on the edges. It is harder than quartz. It is rendered very electric by heat or friction; and by this property a T. may at once be distinguished from a diamond or ruby, for which, otherwise, when cut and set, it might readily be mistaken. A coarse greenish-white variety, called *Pyrophysalite*, occurs near Fahlun, in Sweden, which is not crystallized. When reduced to powder, it can be used as emery for grinding and polishing.—T., though named from the *Topazion* of the ancients, seems to be a totally different mineral.

TOPE, v. *tōp* [Bav. *toppen;* Sp. *topar*, to knock: Sw. *topp;* F. *tope*, an exclamation representing striking hands on the conclusion of a bargain]: properly, to strike the glasses together before drinking; to pledge one in drinking; to drink frequently and to excess; to tipple. To'ping, imp. Toped, pp. *tōpt.* Toper, n. *tō'pėr*, a drinker to excess; a tippler.

TOPE, n. *tōp* [Hind.]: a grove or clump of trees.

TOPE, n. *tōp* [a Cornish word]: small species of shark, of the genus *Galeus* (*G. canis*) and family *Galeïdæ*, having two dorsal fins and one anal fin, spout-holes, and the eyes furnished with a nictitating membrane, the first dorsal situated over the space between the pectorals and ventrals. The T. is very abundant on s. coasts of Britain, but rarer toward the north. Other local names are *Miller's Dog* and *Penny Dog*. It attains a length of about six ft. The T. is extremely troublesome to fishermen, robbing their lines of the fish and biting off the hooks; or, if it happens to be itself hooked, often winding the line round its body in many coils and with tangled knots.

TOPE, n. *tōp* [Pali, *thupa;* Skr. *Stupa* (q.v.), a mound, an accumulation]: a Buddhistic monument raised over or intended for the preservation of a relic or relics, called in Ceylon and elsewhere *dagopa* (the origin of our word 'pagoda'). Another designation of such monuments is *chaitya*. *Tope* (literally, 'accumulation') conveys a sense analogous to L. *tumulus*. *Dagopa* is a corruption of *dhâtu-gopa*—i.e., relic-preserver; and *chaitya* is applied generally to objects of worship, as images, temples, sacred trees, etc. *Tope* is therefore the name of those monuments in regard to their shape; *dagopa* in regard to their purpose and *chaitya* the general term. Though the shape of the T. underwent many changes, it is possible to distinguish its oldest type. The oldest topes are in the shape of cupolas, usually spherical, sometimes elliptical; resting on a cylindrical or quadrangular or polygonal base, which rises either in a straight or inclined line, or in terraces. The top of the cupola, surrounded by a balcony of pillars of a peculiar kind, is crowned by a structure generally

quadrangular, but sometimes in the shape of a reversed pyramid of a few steps; and over this structure is a roof in the shape of an extended parasol. This was the form, e.g., of the topes of Sanchi, of the dagopas of Ceylon, and the oldest monuments of this kind in the Punjab and Afghanistan; though in most of them the parasol, being of wood, is either completely destroyed or barely recognizable in its fragmentary condition. The cupola was sometimes ornamented with more than one parasol; in some of the topes of Sanchi there are three and even five parasols side by side, the middle one exceeding the rest in height. The different arrangement of these parasols, especially when their number increased, led to a different shape of the Tope, e.g., as in China and Tibet. This arrangement consists in placing them one *over* the other; and not only three or five, but even seven, nine, or more are so placed. The height of the structure thus became greater, and the topes, instead of having the character of cupolas, now assumed that of pyramids resting on a cupola base, the parasols gradually giving place to a real pyramidal form. In some monuments of this class, however, the cupola was placed above, when the base consists in round or quadrangular towers rising in a spiral form or in several stories. The Chinese, on the contrary, rejected the cupola altogether, and merely retained the succession of parasols extended one over the other, converting them into a many-storied tower (called *ta* by the Chinese and *pagoda* by foreigners); and the same is the case with the topes of the Mongols, the *Ssuvurghans*, which are pyramids erected on a low quadrangular base. In the interior of the Tope is the cell or chamber (*dhâtugarbha*) where the box, containing the relics and 'the seven precious things' mostly precious metals and gems) was placed. This cell consists of six slabs of stone, firmly closed after the box with the relics, etc., had been placed in it: and it was immured into the Tope after it had been built to a certain height, so that when the Tope was completed the cell enshrining the relic was inclosed on all sides with solid brick-work.—That the cupola of the Tope was intended to represent the water-bubble, the Buddhistic symbol of the hollowness and perishability of the world, is indicated by a legend in the *Mahâvans'a* (q.v.). As the parasol is the emblem of Hindu royalty, it is conjectured that the parasol of the Tope was intended to imply the royal dignity of a Buddhistic saint. When the topes became pyramids or towers consisting of terraces and stories, the number of the stories likewise had a symbolical import: thus, only the topes of the most accomplished Buddhas had 13 terraces; three terraces imply the three worlds; five, the five steps of Mount Meru; etc.

TOPEE, or TOPI, n. *tō-pē'* [from Port.]: in *India*, a covering for the head, as a cork or pith helmet. SOLA TOPEE, *sō'lâ*, a topee made of *sola* pith.

TOPEKA, *tō-pē'ka:* city, capital of Shawnee co. and of the state of Kansas; on the Kansas river, and on the Union Pacific, the Atchison, Topeka & Santa Fé, the Chicago, Rock Island & Pacific, and the Missouri Pacific railroads; 45 m. s.w. of Leavenworth, 65 m. w. of Kansas City, 300 m. w. of St. Louis; 6 sq. m. It is in an agricultural, coal-mining, and stone-quarrying region, and on a high and healthful site, with excellent drainage. Water is supplied from the river by the Holly system, constructed 1880 at a cost of $500,000, and there are more than 30 m. of mains and about 300 double hydrants for fire purposes. The city generally is lighted by electricity, there being 4 commercial plants, and a city plant for street lights. Local transit is provided by electric, steam-motor, and, horse-car lines; one electric road having the largest electric railroad plant in the world. There are 120 m. of streets. The new state capitol cost $2,000,000; the state lunatic asylum cost $1,500,000, and the state reformed school for boys cost $120,000. The new United States Court-house and Post-office cost $300,000. More than 50,000 pensioners draw more than $7,000,000 annually at the United States pension office at Topeka. In 1902, there were 3 national banks (cap. $650,000), 3 state, 2 private, 1 savings and 1 incorporated; and a clearing-house assoc.; and 2 daily, 9 weekly, 3 semi-monthly, and 13 monthly periodicals. The public schools numbered 22, valued at $500,000; the school population was more than 13,000; and 153 teachers were employed. Among denominational schools are Bethany College for Girls (Protestant Episcopal); Washburn College for both sexes (Congregational); Seminary of the Assumption (Roman Catholic); and large parochial schools belonging to the Roman Catholic and German Lutheran churches. The Methodist Episcopal Church has plans for an advanced school to be known as the College of Topeka. Beside these schools there are numreous private schools, and 3 commercial colleges. The city liberally sustains a public library. There are 48 church buildings of all denominations. In 1900 Topeka ranked next to Minneapolis, as the most important milling point in the United States, having 10 mills, with machinery that cost more than $720,000, and a capacity of 2,500 barrels per day. Topeka was incorporated as a city 1857 and became the state cap. 1861. For the fierce conflict on the slavery question 1854-58, in which Topeka was prominently involved, see KANSAS.—Pop. (1880) 15,452; (1890) 31,007; (1900) 33,608; (1910) 43,684.

TOPELIUS, ZACHRIS: Finnish author: b. Kuddnäs, near Nykarleby, 1818, Jan. 14; d. 1898, Mar. 12. He was graduated at the University of Helsingfors in 1840, in 1841-60 edited the *Helsingfors Fidningar,* in which many of his earlier writings first were printed, and held at the university the chairs successively of Finnish

history (1854-63), of the history of Finland and the northern regions (1863-76), and of general history (1876-8). After Runeberg, he is the chief poet of Finland. His religious and patriotic lyrics are particularly valued. Among the collections of his verse are *Flowers of the Heath* (1845-54); *New Leaves* (1870). He wrote also several dramas, such as *After Fifty Years* (1851), and works of fiction, including *A Surgeon's Stories* (1853-67), a cycle based on Finnish and Swedish history from the time of Gustavus II., Adolphus, to that of Gustavus III. There are German translations of several of his writings, and an English version of the *Surgeon's Stories* has appeared in the United States (1883-8).

TOPGALLANTMAST: the third mast above the deck, i.e., the mast above the topmast. Hence, the *topgallant-sail* is the sail suspended from the topgallantmast.

TOPHACEOUS, a. *tō-fā′shŭs* [L. *tophācĕus*, belonging to tufa or tuff—from *tophus*, tufa or tuff]: of the nature of or resembling tophus; gritty; sandy. TOPH, n. *tŏf*, or TOPHUS, n. *tō′fŭs*, a swelling affecting a bone or the periosteum; a calcareous concretion about the joints, occurring chiefly in gouty persons.

TOPHANÉ, *tō′fâ-nā* (correctly, TOP-HANEH, *tōp-hâ′-nėh*): a suburb of Constantinople (q.v.).

TOPHET, n. *tō′fĕt*, or TO′PHETH, n. *-fĕth* [derived by some from Heb. *toph*, a drum, from the beating of drums, and other discordant noises there, made to stifle the cries of the sacrificed children]: in *Scrip.*, a place s.e. of Jerusalem, in the valley of Hinnom, where the idolatrous Jews worshipped the fire-gods and sacrificed their children (see GEHENNA).

TOPHUS. See under TOPHACEOUS.

TOPIARY, a. *tŏp′ĭ-ėr-ĭ* [L. *topĭārĭus*, belonging to ornamental gardening—from *topĭa*, ornamental gardening—from Gr. *topos*, a place]: shaped by cutting and clipping, as trees and hedges. TOPIA′RIAN, a. *tŏp-ĭ-ā′rĭ-ăn*, of or pertaining to ornamental gardening.

TOPIC, n. *tŏp′ĭk* [Gr. *topĭkŏs*, belonging to a place—from *topos*, a place, a topic: F. *topiques*, subjects of conversation: It. *topico*, topical]: subject of discourse or argument; a general head: in *rhet.*, one of the various general forms of argument to be employed in probable, as distinguished from demonstrative, reasoning; a general conception or proposition which may serve as a guide in the invention and choice of suitable arguments; a class or category of considerations or conceptions from which probable arguments can be drawn (see TOPICS): in *med.*, an external remedy. TOPICAL, a. *tŏp′ĭ-kăl*, pertaining to a topic (in its rhetorical sense); hence, merely probable, dealing with a particular topic or theme, as a *topical* arrangement; referring to local matters as *topi-*

cal allusions: in *med.*, applied externally and to a particular part, as a poultice, a blister, and the like. TOP'ICALLY, ad. *-lĭ.*

TOP'ICS [Gr. *topike,* from *topos,* a place]: name given by the Greek and Roman rhetoricians and grammarians to the art of discovering arguments. It consisted in the eliciting out of the series of particulars certain general conceptions and propositions, which, in the elaboration of oratorical discourses, served as guides in the invention and choice of suitable arguments. Any one such general conception was called in Greek *topos;* in Latin, *locus communis* (a 'common place'). The Greeks gave much attention to this art; among the Romans Cicero composed *Topica,* and various other treatises of a kindred nature. During the middle ages, it was proposed to apply it to the whole circle of human knowledge and even to the solution of the most difficult intellectual problems: but, in general, these efforts only resulted in empty exhibitions of mental vivacity (*jeux d'esprit*); and in modern times the so-called 'art' has been entirely discarded.

TOPLADY, *tŏp'la-dĭ,* AUGUSTUS MONTAGUE: English clergyman, controversialist, and hymnist: 1740, Nov. 4—1778, Aug. 11: b. Farnham, Surrey. He was educated at Westminster School, London, and Trinity Coll., Dublin; was ordained 1762, and became vicar of Broad Hembury, Devonshire, 1768. He wrote much of the *Gospel Magazine.* Toplady was a great champion of Calvinism. His controversial writings are directed against the followers of Wesley, and show an unfortunate theological asperity. He was a far better poet than controversialist; and some of his hymns have a place in all popular collections in England and America: one of his hymns is the familiar *Rock of Ages.*

TOPOGRAPHY, n. *tō-pŏg'ră-fĭ* [Gr. *topos,* a place; *graphō,* I write or describe: F. *topographie*]: literally, a description of places, as of rivers, hills, woods, etc.; but especially a detailed description of a particular place, as a city, a town, a tract of country, etc., including notices of all its features—differing thus from geography in being more minute. TOPOGRAPHIC, a. *tŏp'ō-grăf'ĭk,* or TOP'OGRAPH'ICAL, a. *-ĭ-kăl,* pertaining to topography; descriptive of a particular place or of places. TOP'OGRAPH'ICALLY, ad. *-lĭ.* TOPOGRAPHER, n. *tō-pŏg'ră-fėr,* one who describes particular places in writing; also TOPOG'RAPHIST, n. *-fĭst.*

TOPOG'RAPHY, MILITARY: minute description of a place or country, for military purposes. Among the first necessities of a military commander is a thorough knowledge of the physical conformation, the obstacles, and the resources of the region in which he has to operate. It frequently happens that the field of warfare is one of which no careful survey is procurable. It devolves, then,

on the officers of the staff to make their chief acquainted with all requisite particulars; hence, topographical drawing is a principal element in military study. One sent out from an army on a topographical survey is expected to traverse a country with rapidity, to measure distances by eye or intuition, to note them down roughly as he rides, to obtain a general knowledge of hills and valleys, of roads and ravines, rivers and the means of crossing them. He must at the same time acquaint himself with the means of sustenance in the country, with the feelings of the people—friendly or hostile—with the transport which can be drawn from the inhabitants, with the position and strength of fortified places, etc. After his reconnaissance, often fatiguing and dangerous, he is expected to submit an eye-map or a full report.—See ENGINEERS, UNITED STATES CORPS OF.

TOPOLOBAM'PO BAY, Mexico: a small bay of the Gulf of California on the west coast of the state of Sinaloa. It is noted on account of the attempt made in 1886 by a number of Socialists of the United States to form a co-operative community on its shores. A company was chartered, in which all the colonists were stockholders, and which was to own all the land, and conduct all the business of the community. Everything was to be done as far as possible on the socialistic plan as described in Bellamy's *Looking Backward.* Several hundred colonists joined in the experiment, and a city was surveyed and laid out on an elaborate plan. The experiment, however, was a failure, largely owing to aridity of the land and the absence of available streams for irrigation. The place was abandoned in 1891.

TOPONOMY, n. *tŏ-pŏn'o-mĭ* [Gr. *topos,* a place; *onoma,* a name]: the place-names of a country or district; a register of such names. TOPONYMICAL, a. *tŏp-o-nĭm'ĭk-al,* of or pertaining to toponomy or place-names.

TOP'OPHONE: an instrument for determining the direction from which any sound proceeds. It is valuable for use at sea, during fog, or in the night, to determine the direction of a sounding bell, fog-horn, whistle, etc. The topophone was invented by A. M. Mayer, and consists, briefly, of a horizontal bar turning freely on a pivot at its centre, and having at each end of the bar resonators, with their openings facing the same way, each with a connecting sound tube for the ears of the observer. In use the bar is turned until a position is found in which the sound is loudest and equally distinct in each ear. The location of the sound is at a right angle to the bar in the direction to which the resonators face.

TOPPLE, v. *tŏp'pl* [from TOP 1]: to fall forward, as something that is top-heavy; to tumble. TOP'PLING, imp. *-plĭng:* ADJ. threatening to fall. TOPPLED, pp. *tŏp'pld.*

TOP'-SHELL. See TROCHIDÆ.

TOPSY-TURVY, ad. *tŏp'sĭ-tėr'vĭ* [a corruption of the phrase, *topside t'other way;* or, as has been suggested, from the idea that the *topside is to be turfy* or placed upon the ground]: in an inverted posture; bottom upward; in confusion.

TOQUE, n. *tōk,* or TOQUET, n. *tō-kā* [F.]: a kind of head-dress, formerly worn by both men and women; a small hat with turned-up brim; in modern usage, a bonnet consisting of a round close-fitting crown without brim. TOQUE, n. a kind of money of account, equal to 40 cowries, used by traders on the west coast of Africa.

TOR, n. *tŏr* [AS. *torr,* a high hill, a peak (see also TOWER)]: in *Devon* and *Derbyshire,* England, a tower; a high, pointed hill; a jutting rock.

TORAH, n. *tō'râ* [Heb. *Torah,* the law]: the laws of the Jews as recorded in the Pentateuch; the Pentateuch.

TORBANE HILL MINERAL: mineral known also as BOGHEAD COAL (see TORBANITE), valuable as a source of Paraffin Oil or Naphtha (q.v.). Whether it is to be classed as coal or as shale has been debated among men of science.

TORBANITE, n. *tŏr'bă-nīt* [*Torbane Hill,* near Bathgate, Scotland]: well-known species of cannel-coal, used for the manufacture of paraffin-oil, candles, etc.; Torbane Hill Mineral (q.v.).

TORBERT, *tor'bėrt,* ALFRED THOMAS ARCHIMEDES: soldier: 1833, July 1—1880, Sep. 30; b. Georgetown, Del. On graduating from West Point, he was assigned to an infantry regt., and served 5 yrs. on the frontier. At the outbreak of the Civil war he was lieut.; was made col. of the 1st N. J. regt., and capt. in the regular army, 1861. Through the Peninsular campaign he commanded a brigade; was commissioned brig.gen. of volunteers 1862, and was in the battle of Gettysburg. Thereafter he commanded cavalry troops, and 1864, Aug. 8, was chief of cavalry in Sheridan's army of the Shenandoah. By his brilliant services he earned the brevet rank of major general of volunteers 1864, Sep. 19, and of major general in the regular army 1865. He was in the diplomatic service 1869-78.

TORCE, *tawrss:* in *her.,* garland or wreath of twisted silk, by which the crest is joined to the helmet (see TORSE).

TORCH, n. *tŏrch* [F. *torche,* a torch, the wreathed wisp of wad or straw placed between the head and the burden on it—from mid. L. *tortĭa,* a torch—from L. *tortus,* pp. of *torquērĕ,* to twist]: a light to be carried in the hand when lighted, formed of some combustible material, such as resinous wood, or of cotton, hemp, or flax, well tarred, or steeped in grease or the like; a flambeau. TORCH-BEARER, one who carries a torch lighted. TORCH-LIGHT, the light given by torches.

TORE, v. *tōr:* pt. of the verb TEAR (q.v.): N. the dead grass which remains on mowing land during winter and spring.

TORE, n. *tōr:* see TORUS.

TOREADOR, n. *tŏr-ĕ-ă-dŏr'* [Sp.—from *toro,* a bull]: in *Spain,* an amateur bull-fighter, who kills the bull from horseback with a short, broad-headed spear; the *toreador* only appears now at royal feasts in Madrid, and is always accompanied by a troop of professionals; *torero* is the general name for a professional bull-fighter.

TOREUMATOGRAPHY, n. *tō-rū'mă-tŏg'ră-fĭ* [Gr. *toreuma,* embossed work; *graphō,* I write or describe]: a description of sculptures and basso-relievos, especially in metal; also TOREU'MATOL'OGY, n. *-tŏl'ŏ-jĭ* [Gr. *logos,* discourse].

TOREUTIC, a. *tō-rū'tĭk* [Gr. *toreutikos,* pertaining to work in relief—from *toreuō,* I work in relief]: carved or embossed—applied to figures in metal, hard wood, ivory, etc.

TORGAU, *tor'gow:* town of Prussia, and a fortress of the second rank; on the left bank of the Elbe, 70 miles s.s.w. of Berlin, 12 miles north of the frontier of Saxony. The river is here crossed by a bridge 500 paces in length, supported on 15 stone piers. Among public buildings are the castle, on an island in the Elbe, begun 1481, now used as a barrack and magazine, and comprising a chapel consecrated by Luther 1544; a town-church, with pictures by Cranach; a gymnasium, and other schools. Weaving and brewing were formerly briskly carried on at Torgau, but this industry has declined. A battle was fought here 1760, Nov., in which Frederick II. of Prussia defeated the Austrians. Pop. (1900) 11,811, a large proportion soldiers.

TORGET, *tor'ghĕt:* small island off the northwest coast of Norway, lat. 65° 30′ n. It serves as a landmark to sailors, is the haunt of numerous water-fowl, but is noteworthy chiefly for its lofty rock called Torghatten (the Hat of Torget), which rises 756 ft. above sea-level, and is pierced, near its top, by a cave or passage 80 ft. wide and 1,300 ft. long.

TORLONIA, *tor-lō'nĭ-â:* princely Roman family, remarkable for wealth and for their extaordinarily sudden rise from the very lowest condition. Their origin is traced to a poor 'cicerone,' Giovanni Torlonia (b. 1754), who hung about the Piazzi di Spagna in Rome, and gained a precarious living by showing visitors over the Colosseum. By steadiness and honesty, he obtained reputation, became afterward an agent of the French emissaries sent to excite the Roman populace to revolution, and on the failure of this project was left with considerable funds in his hands; he afterward married a widow of some property, and became a merchant, gradually rising, by keen foresight and enterprise, to the position of

a stock-broker, usurer, and money-dealer; and by acquiring mortgages over the properties of the impoverished Roman princes, and by various other happy ventures, ultimately amassed immense riches. He was made a grandee of Spain, and Duke of Bracciano by the pope. His three sons allied themselves with princely families of the highest rank; the eldest succeeded to the dukedom, and the two others carried on their father's business. The youngest became Prince of Civitella-Cesi and Duke of Ceri.

TORMENT, v. *tŏr-mĕnt'* [F. *tourment,* torment—from L. *tormen'tum,* a cord or rope, an instrument of torture —from *torquĕō,* I twist]: to put to extreme pain or anguish; to torture; to harass; to distress; to tease or vex: N. *tŏr'mĕnt,* extreme pain; torture; misery. TORMENT'ING, imp.: ADJ. paining to a distressing degree. TORMENT'ED, pp. TORMENT'ER, n., or TORMENT'OR, n. *-ėr,* one who torments; a kind of harrow on wheels for reducing a stiff soil. TORMENT'INGLY, ad. *-lĭ.*

TORMENTIL, n. *tŏr-mĕn'tĭl* [L. *tormen'tum,* torture, anguish (see TORMENT)]: plant of the genus *Tormentilla,* ord. *Rosācĕæ,* sub-order *Potentilleæ,* differing from *Potentilla* (q.v.) only in the 4-parted calyx and corolla, and now united with it by many botanists. The COMMON TORMENTIL (*T. officinalis,* or *Potentilla tormentilla*) is a common plant in moorish and heathy places throughout great part of Europe. It has a large woody root, which has long been officinal, being an agreeable and efficacious astringent, useful in diarrhœa and other disorders; and containing tannin, gum, and a red coloring matter, not soluble in water, used by the Laplanders for staining leather red. The leaves are ternate, leaflets lanceolate and inciso-serrate, stems ascending and forking, flowers yellow.

TORMINA, n. plu. *tŏr'mĭ-nă* [L. *tormĭna,* gripes, colic —from *torquĕō,* I twist]: in *med.,* griping or twisting pains, especially in the belly. TOR'MINOUS, a. *-nŭs,* affected with or characterized by tormina.

TORN, v. *tōrn:* pp. of TEAR (q.v.).

TORNADO, n. *tŏr-nā'dō* [Sp. *tornada,* a return—from *tornar,* to return (see TURN)]: any violent storm, whirlwind, or hurricane, usually attended with thunder, lightning, and rain, generally limited in area, and of short duration; a whirlwind or whirlstorm. See CYCLONE; STORMS; HURRICANE; WIND; WHIRLWIND; etc.

TORNEA, *tor'nĕ-â:* river, forming part of the boundary-line between Russia and Sweden; rising in Lake Tornea, in Sweden, and, flowing s.e. and s. between Russia and Sweden, entering the n. extremity of the Gulf of Bothnia, after a course of 250 m. At its mouth is the small town Tornea.

TORONTO, *tō-rŏn'to:* city, capital of the province of Ontario, Canada; on the large sheltered bay of Toronto

between the mouths of the Don and Humber rivers on the n.w. shore of Lake Ontario, lat. 43° 39′ n., long. 79° 23′ w.; 165 miles from Kingston, 310 miles w.s.w. of Montreal, 513 miles s.w. of Quebec, 500 m. n.w. of New York. The Grand Trunk and the Canadian Pacific railroads and many branch lines connect Toronto with the principal cities of Canada and the northern part of the U. S. The city is also the headquarters of the Canadian Northern Ry. There are daily steamboat connections with all the principal ports on the lakes and St. Lawrence river during the season of navigation, lines running regularly to Montreal, Niagara, Charlotte, Hamilton, Oakville and other ports.

Topography.—The scenery of the vicinity is somewhat tame, but beautiful; the southern portion of the city is low, but the ground rises gradually to the sheltering plateau on its north, over which the city extends, the height being 250 ft. above the level of the lake, and the Queen's Park in the mid-centre, containing the university, observatory, and handsome private residences, is about 140 ft. above the level of the lake. The harbor or bay, about 5 m. long and a mile wide, is formed by a curving spit of land extending 3 m. s. and w. into the lake. Toronto has somewhat the appearance of an English town; area 18½ sq.m., and is regularly laid out with streets crossing at right angles.

Public Works, Building, Parks, Etc.—Toronto is provided with an excellent water supply, pumped from the lake into a large reservoir at Rosedale 216 ft. above the level of the lake and 9½ acres in extent; has 102 miles of street railroads, gas and electric light plants, paid fire department, and fire-alarm telegraph and telephone services. There are more than 280 miles of streets. The electric railway operates about 90 miles of track. Among the 28 public parks, which aggregate 1,700 acres, the largest and most attractive are: Howard, overlooking the lake to the west; Queen's, with the new houses of parliament facing the main entrance; Riverdale, overlooking the valley of the Don; Allan Gardens, Exhibition Park, and the Island Park. Besides these there are many smaller parks. The principal public buildings are those of the University of Toronto, the parliament buildings, the government house, the official residence of the lieutenant-governor; Osgood Hall, containing the various superior law courts of the province; the custom-house, the post-office and court house, the normal school building, the Canadian Institute, the observatory, libraries, and numerous hotels and commercial and industrial buildings. There are several theatres and public halls, one of which, the Massey Music Hall, seats about 6,000 persons.

Churches and Educational Institutions, Etc.—Of about 206 places of worship, the Methodist church has 41; Episcopal, 44; Presbyterian, 32; Baptist, 21; Roman Catholic, 15; Congregational, 9; Salvation Army, 6; Lutheran, 2; Reformed Episcopal, 2; and Jewish, 4. The

ONTARIO PARLIAMENT BUILDINGS.

most notable edifices architecturally are the Anglican Cathedral of St. James, with a grand steeple and a famous chime of bells; the Roman Catholic Cathedral of St. Michael, recently improved and redecorated; the St. James' and St. Andrews' (Presbyterian); the Methodist Metropolitan, with its large organ; the Baptist church on Jarvis street; the Congregational church on Bond street; and the Church of the Ascension (Anglican). Toronto is the head of the Canadian educational system. The city school system comprises over 60 public schools; a model school; a normal school, containing the offices of the department of education; and five collegiate institutes, the total number of teachers being about 770 and the average daily attendance in public schools, 32,000. For their maintenance over $600,000 is appropriated annually. There are also a museum connected with the normal school; 18 Roman Catholic parochial schools, with more than 5,000 pupils and 110 teachers, and other Roman Catholic primary and secondary institutions. Among the institutions for advanced education, for which Toronto has long been noted, are Upper Canada College for boys, under the patronage of the provincial government; Trinity University, founded by Bishop Strachan, of the Anglican church, 1851; McMaster Hall, a Baptist college, made a university 1887, endowed by a bequest of the late Senator McMaster with $800,000, and affiliated with several Baptist colleges; Knox College, the principal theological school of the Canadian Presbyterian church; Wycliffe College, an Anglican theological school; St. Michael's College, a Roman Catholic seminary; and a College of Pharmacy, Veterinary College, College of Physicians and Surgeons, Royal College of Dental Surgeons of Ontario, and a College of Music. The most notable institution of all is the Toronto University, founded by royal charter as King's College 1827, and liberally endowed with public lands. In 1860 the university occupied a new and attractive building that cost more than $500,000, and a beginning had been made in an effort to perfect a complete university federation for the whole province; 1890, Feb. 14, the building was seriously damaged by fire, and its valuable library destroyed. New buildings, of imposing architecture, forming a quadrangle, have been erected. The university has been recently enlarged, amply endowed by the province, and placed under a board of governors. Trinity University, Victoria College (Methodist, arts and divinity), Knox College, Wycliffe College, St. Michael's College, and the colleges of medicine, dentistry, veterinary science, pharmacy and music are connected with the University of Toronto. The agricultural college of the university, situated at Guelph, Ont., is also affiliated with Toronto University. There are also St. Andrew's College, for boys; Havergal College, for girls; Bishop Strachan's School; St. Margaret's College; Moulton College, for girls; the magnetic observatory, and the Canadian Scientific Institute.

Libraries, Charitable and Penal Institutions.—The libraries of the city include that of the department of education (9,000 vols.); the library of parliament (40,000 vols.); the library of the Law Society of Toronto, in Osgoode Hall (20,000 vols.); a public library containing 61,000 vols. and about 10,000 pamphlets; the library of the Canadian Institute (4,000 vols.); and the library of the University of Toronto (76,000 vols. and 22,500 pamphlets). Toronto is well supplied with charitable institutions, having a large general hospital, Grace and St. Michael's hospitals, Asylum for the Insane, House for Incurables, House of Providence, Girls' Home, Boys' Home, St. Nicholas Institute for Boys, Hospital for Sick Children, Infants' Home and Infirmary, etc. The penal institutions are the Central Prison and the Mercer Reformatory.

Commerce, Industries and Finance.—Toronto is the second city in the Dominion in commercial importance and second only to Montreal as a railway centre. During the winter shipping is suspended on the Lakes but during the open season commerce is very active. The chief articles of commercial importance are grain, lumber, cattle, coal, and fruit, the value of the annual imports exceeding $31,000,000 and exports $10,000,000. The receipts at the Toronto custom house average $8.000,000 annually. The manufactures consist principally of boots and shoes, stoves, pianos, engines, boilers, pipe, safes, sewing machines, furniture, clothing, etc., and there are also a large agricultural implement factory, iron foundry, machine shop and ship-building, pork-packing, and brewing and malting establishments. The city contains 23 chartered banks, and 31 saving banks, with combined assets of $876,553,557; capital stock (paidup), $82,799,558; and deposits, $516,594,209. There are also a number of loan and investment companies with an aggregate capital of over $35,000,000. The assessed valuation of real and personal property is about $175,000,000 and the net debt $16,285,309, against which the city has property valued at about $13,000,000. The budget is about $6,000,000 annually; the greater portion of which is raised by taxation, fees, licenses, water rents, etc.

Government, History, Population.—The administration of municipal affairs is vested in a mayor and a board of 18 aldermen, 3 from each of the 6 wards into which the city is divided. Besides the usual departmental committee and officials there is also a board of control consisting of 4 aldermen and the mayor *ex officio*. Toronto was founded in 1794 by Maj.-Gen. John Graves Simcoe, first governor of Upper Canada, who, finding his headquarters at Newark or Niagara too close to the frontier for use as a seat of government, removed them to the opposite side of the lake on a site which is now the eastern part of the city. In 1814 the city was twice sacked and burned by U. S. troops and in 1837 was the scene of the outbreak under Wm. Lyon Mackenzie, culminating

in self-government. Toronto was the seat of government for Upper Canada till 1841; alternated with Quebec as the seat of government 1849-59; and since 1867 has been the permanent capital of the province and the seat of the provincial government. It was known as Muddy York and York till 1834, when it was chartered under its present name. Since the fires of 1813 Toronto has several times suffered from conflagrations, notably in 1849, 1890 and April 1904. In the fire of 1904 more than 100 buildings in the wholesale business section were destroyed, entailing a loss of about $11,000,000. In 1834 the population was less than 10,000; since then the growth has been as follows: (1861) 44,821; (1871) 56,092; (1881) 86,415; (1891) together with annexed suburbs, 181,220; (1901) 208,040; (1909) estimated 280,000. Consult Adam, *Toronto, Old and New: Historical, Descriptive, and Pictorial;* Scadding, *Toronto of Old;* Scadding and Dent, *Toronto, Past and Present;* Adam, *Illustrated Toronto, the Queen City of the West;* and the annual reports issued by the various departments of the city government.

TORONTO, UNIVERSITY OF: situated at Toronto, Canada, the head of the educational system of the Province of Ontario. The first step toward the establishment of the university was taken in 1797 when the Council and Assembly of Upper Canada petitioned the king for an appropriation of crown lands for the purposes of education, and the establishing of a university. The appropriation was made, but nothing further was done toward the founding of the university until 1827, when it was chartered under the name of the University of King's College; the organization of the university was further delayed, largely owing to objections to the sectarian character of its charter, which was amended in 1837; and it was not till 1843 that it was opened to students. In 1849 the name was changed to the University of Toronto; in 1853 the university was further transformed by the organization of two corporations, known as the University of Toronto and the University College; to the latter was assigned the teaching in arts and the entire control of its students; in 1887 a second reorganization transferred a part of the teaching in arts to the university faculty, and more closely federated the institutions which had previously been affiliated with the university; these affiliated institutions were mostly denominational colleges. Since 1887 there have been affiliated Victoria University at Cobourg, and a number of technical and professional schools, including the Ontario Agricultural College, Royal College of Dental Surgeons, the College of Pharmacy, the Toronto College of Music, the School of Practical Science, and the Ontario Veterinary College. These affiliated colleges are entitled to representation on the University Senate, which has charge of the educational policy. The University

Council, which has charge of the discipline and control of students, etc., is composed of the heads of the teaching departments in the university, and of the scientific arts and theological colleges. In 1903 took place the federation of the University of Trinity College, with the University of Toronto. The university proper includes a faculty of arts, a faculty of law, a faculty of medicine, and a faculty of applied science and engineering. It also has instituted courses and examinations for degrees in dentistry, pharmacy, agriculture, music, pedagogy and household science; and other courses leading to diplomas only in commerce and gymnastics. University extension work is conducted by a special committee of the University Senate at local centres. Women are admitted to the university. Among the important buildings are the main building, the library, and the chemical, biological, and medical buildings. The students in arts, medicine, and applied science in the University of Toronto number over 2,100.

TORPEDO, n. *tŏr-pē'dō* [L. *torpēdo,* stiffness, numbness—from *torpērĕ,* to be still, to be stiff with frost: It. *torpedine*]: the cramp-fish; a fish which gives electric or benumbing shocks when touched; also the genus to which this fish belongs (see below): a machine or engine which, partially submerged in the sea, explodes on contact with a ship's side, either greatly injuring or wholly destroying it; the name is also given to other destructive agents in warfare. *Note.*—TORPEDOES are either submerged and fixed in order to protect a harbor or coast against hostile attacks, or are sent directly against an enemy's ship by means of internal motive-power from a specially constructed and very swift steam-vessel called a TORPEDO-BOAT (see TORPEDOES).

TORPE'DO: genus of fishes of order *Raiiæ* (see RAY), family *Torpedinidæ.* All the *Torpedinidæ* were formerly included in this genus, itself originally formed from *Raia;* but it has been divided into a number of genera, as *Torpedo, Narcine, Astrape,* etc. The *Torpedinidæ* have a short and not very thick tail, cylindrical toward the end, keeled on the sides. The disk is rounded, and has neither scales nor prickles. The most remarkable characteristic, however, is the galvanic battery, which all the species possess: see ELECTRICITY, ANIMAL. The name torpedo is commonly extended in a popular sense to all the *Torpedinidæ.* Two species of torpedo are occasionally found on s. coasts of England—*T. vulgaris* or *marmorata,* which sometimes attains a large size, weighing 100 lbs.; and *T. Nobiliana,* apparently more rare: they are readily distinguished by the spiracles behind the eyes, which are round and fringed at the edges in the former, oval and perfectly smooth in the latter. These and other species are more plentiful in the Mediterranean, and the *Torpedinidæ* generally belong to the warmer seas. The popular names *Numb-fish, Cramp-fish,* and *Cramp Ray* are

given to torpedoes. The electric shock which a large torpedo gives when seized is so severe that no one desires to experience it a second time.—*T. occidentalis* occurs on the Atlantic coast of the United States; it is black above and white below. *T. Californica* is spotted.

TORPE'DO-BOAT: boat designed to place torpedoes under or against vessels for their destruction. The conception of a modern torpedo-boat is a very fast vessel, dependent for offensive purposes chiefly on torpedoes and on her speed, though most boats carry a few rapid-fire guns. The first torpedo-boats were of wood; of this type was the *Stiletto*, the first torpedo-boat added to the U. S. navy; this boat was 94 ft. long and had a speed of 18 knots. The modern torpedo-boats are built entirely of steel, and divided into water-tight compartments; they are fitted with double boilers and engines, so arranged that if either boiler or engine is injured the other can be used independently. Usually two or three torpedo tubes are carried; they are placed on a revolving circular track on the deck, so that the torpedoes can be discharged in almost any direction. The torpedoes are launched by electric connections from one or from two tubes simultaneously at the will of the commander, and can, by the improved mechanism, be discharged while the boat is at full speed. There are two conning towers, one forward just abaft the second compartment, and one aft; the forward tower is the one commonly in use, the other for emergencies. They are both fitted alike with steering wheel and compass, signal tubes and bells to the engine rooms, and the electric key for discharging the torpedoes. A small mast for setting signals is carried aft of the forward tower. The quarters for the officers are generally forward in the second compartment, and the quarters for the crew are aft. The torpedo-boats lie low in the water, and for this reason and on account of the small deck space and cramped quarters are very uncomfortable and trying for their crews. The *Porter*, which was in Admiral Sampson's fleet during the Spanish-American war, was the first high-speed vessel of her class to be added to the navy. On her trial trip in 1897 she maintained a speed of 28.74 knots on a 60 m. run. The more modern boats have attained a speed of 30 knots; among the fastest boats of this class in the U. S. navy are the *Bailey*, which has a speed of 30.198 knots, 280 tons displacement, and carries 2 18-in. Whitehead torpedo tubes; the *Farragut*, with a speed of 30 knots, 279 tons displacement, carrying 2 18-in. torpedo tubes; the *Stringham*, with a speed of 30 knots, 340 tons displacement, carrying 2 torpedo tubes; the *T. A. N. Craven*, with a speed of 30 knots, 146 tons displacement, carrying 2 torpedo tubes; and the *Bagley*, with a speed of 29.15 knots, 175 tons displacement, carrying 3 Whitehead torpedo tubes.

The sucessful use of the torpedo-boat in warfare and

their ability to destroy large battleships with comparatively little danger to themselves and their crews, have led to the building of torpedo-boat destroyers; these are built on the same general plan as the torpedo-boats, but have about twice as great a displacement, and carry more and heavier rapid-fire guns; in addition they often carry as many as 2 torpedo tubes. They have about the same speed. Among the fastest destroyers in the U. S. navy is the *Worden,* with a speed of 29.86 knots, 433 tons displacement.

Torpedo Boat Warfare.—During the days of the spar torpedo in the American civil war, the Russo-Turkish war, and the war between France and China, there were 15 attacks made by torpedo boats with this weapon. Twelve of these attacks were made at night and three by daylight. There were 33 torpedo boats engaged in these attacks and the number of men employed was about 350. Three boats were lost and 12 men were killed. On the other hand, they succeeded in sinking four ships and injuring three, with a total loss of over 400 lives. At that time ships were armed with muzzle-loading smooth bores, howitzers, and machine guns. Since the advent of the Whitehead torpedo the armament of ships has undergone a radical change and all are now well supplied with a secondary battery of rapid-fire guns each capable of firing 10 to 15 shots a minute. There have been nine attacks made by torpedo boats or destroyers using the automobile Whitehead, and this number does not include those boats used in the war between Japan and Russia. Twenty-seven boats were employed, but only 16 were under fire and discharged their torpedoes. Two boats were lost and of the 500 men engaged in the nine attacks less than 2 per cent were killed. On the other hand, eight vessels were sunk, including one battleship, two armored cruisers, three protected cruisers, a tug boat and a schooner. See TORPEDOES.

The following table shows the number of boats possessed by some of the principal naval powers, 1908:

	Destroyers.	Torpedo Boats.	Torpedo Gunboats.
England	158	167	17
France	76	331	..
Germany	93	47	21
Russia	80	55	8
Japan	62	95	..
United States	16	36	40

TORPEDO DRAG: a device for clearing harbors, river-channels, etc., from floating torpedoes and submarine mines. It consists of a long cable bearing grappling hooks set at frequent intervals. The ends of the cables are made fast in boats, one on either side of the channel, and as the vessels proceed up and down the channel, abreast, the hooks on the rope between them catch the torpedoes. Sometimes a drag note is thrown ahead of a vessel by a small mortar.

TORPEDOES.

TORPE'DOES: properly, explosive devices for inflicting injuries on an enemy's ships below the water-line, though during the war between the United States and Great Britain 1812–14, this name was applied to mysterious boats invented by Fulton and other Americans intended to be navigated beneath the surface of the water, and directed against the bottoms of hostile vessels. Modern T. are of two kinds—first, the locomotive torpedo, which is in various ways projected against the side of a hostile vessel; this is the torpedo proper, and is an offensive device; secondly, the fixed torpedo, a kind of stationary bomb-shell intended to explode under the bottom of the enemy's ship, and properly a defensive device: to these fixed torpedoes it is now more usual to give the appropriate name of submarine mines.

The weapon was used first by the Russians in the Baltic 1854; but in the Amer. war of secession of 1861–65 it was extensively and often successfully employed. The damage effected by a torpedo exploding beneath a ship is very great, but the failures are very frequent by the explosion

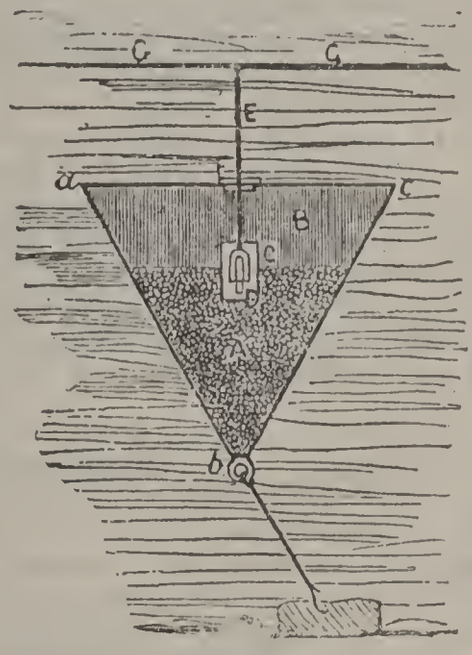


Fig. 1.

happening at a wrong moment. In the Franco-German war 1870–1, the French fleet was effectually scared from the Prussian ports by the dread of T.; and they were much employed in the Russo-Turkish war of 1877.

Of fixed T., or submarine mines, there are two classes—those which are self-explosive on a ship touching them, and those whose explosion depends on an electric current from the shore. A torpedo of the self-acting class is shown in fig. 1: *abc* is a hollow iron cone, water-tight, with a ring at *b* by which to anchor it. The upper part, B, is left empty, for the sake of buoyancy, while the lower end, A, is filled with gunpowder, the charge varying from 100 to 300 lbs. At the top of the powder is an iron case, C, filled with lime, and in it a tube of thin glass, D, containing sulphuric acid. The upper part of the glass tube is enveloped by the

ringed end of the iron rod, E, which passes through the top of the torpedo, and some distance above it; and has horizontal rods, G, called feelers, attached rigidly to its upper extremity. When a ship impinges on the feelers, the rod is deflected from the perpendicular; the ring at its lower end breaks the glass tube; the acid, acting on the lime, generates great heat, and explodes the powder.

In the electric torpedo a wire insulated in a small cable is laid from a battery on shore to the submarine mine. It enters it by an insulated joint, and is then soldered to a small piece of platinum wire placed in the middle of the priming of the torpedo; from the other end of the platinum a second wire communicates with the metal sides of the torpedo case. On closing circuit at the battery, the current passes by the cable into the torpedo, heating the platinum to incandescence, and exploding the mine. There is thus no need of a second cable; the water and the earth take its place. Submarine mines are charged usually with gun-cotton, which has the great advantage of being explosive by means of a fulminating fuse, even when wet through leakage of the torpedo case.

Submarine mines are usually moored or laid on the bottom in several lines, the mines of the second line opposite the intervals of the first, so that it is difficult for a hostile ship to pass up a defended channel without coming within reach of one or more of them. As a ship approaches, her course is carefully watched so as to fire a mine at the right moment. To explain how this is done, let us take the case of the channel AB.

Two or more lines of mines are laid down across its mouth. For clearness only a few of those of the first line are shown in the diagram. At C and D two stations are

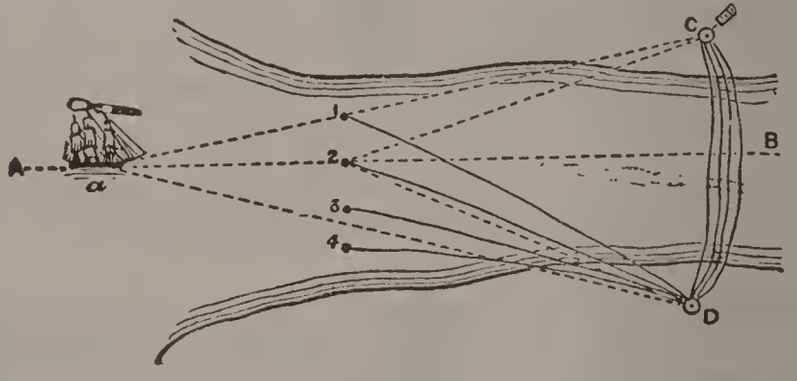


Fig. 2.

selected, commanding a view of the defended waters. At C is the voltaic battery, and the wires from the mines connect them with D, while a second series of wires, each corresponding with one of the first series, connects D and C. There are thus two breaks in the circuit of every mine—one at C, where a number of 'firing-keys' are arranged so as to place at will the battery in connection with any of the wires; the second break is at D, where similar firing-keys connect at will each wire of one series with the corresponding wire of the other. A ship is seen approaching on the course AB. When she is at *a*, the observer at C

notices that her bearing is the same as that of mine No. 1. He therefore closes the break in the first circuit by means of the firing-key, but no current passes, for the observer at D sees her well to the left of the bearing of mine No. 1, and therefore leaves his break open. Not until she is actually over No. 2 will both observers at the same moment see that her bearing corresponds to that of No. 2, and, closing both breaks in the circuit, fire the mine. By means of a telescope combined with the firing-key, these bearings can be taken with great accuracy. In some cases the ship herself is made to close the circuit in striking a rather complicated apparatus called a circuit-closer, which floats above each of the mines arranged on this system.

Of locomotive or offensive T. there are three classes: (1) The Whitehead fish torpedo, which has a fish-shaped

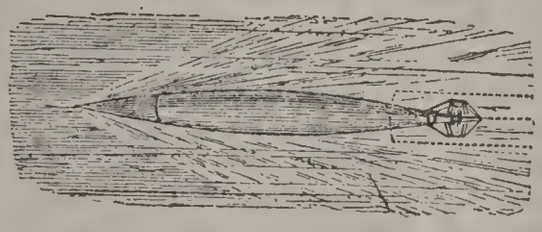


Fig. 3.—Whitehead Torpedo.

case, and is propelled in a straight line under water by means of a small screw-propeller driven by compressed air. It is discharged from a carriage on the deck of a man-of-war, and explodes on impact against the object aimed at. The secret of the construction has been sold by the inventor to the Austrian, Russian, and British navies. (2) The Harvey 'towing torpedo,' which is towed out at an angle from the side of the attacking ship, and maneuvered so as to come in contact with the bottom of the ship attacked, and exploded either mechanically on contact, or by means of an electric fuse, the wire being inserted in the towing-line (these are now considered unavailable). (3) Boom or outrigger T., which are carried on long booms in the bows of boats or steam-launches, and thus driven against the side of a hostile ship and exploded (these also are now considered unavailable).

Torpedo-nets, for intercepting T., are steel-wire nettings suspended from long booms attached to a ship's side: protective for ships at anchor, but unavailable for ships under way.—See *Fraser's Magazine*, 1872; illustrated articles in the *Popular Science Review*, 1873–75; and Sleeman's *Torpedoes and Torpedo Warfare* (1880).

TORPID, a. *tŏr'pĭd* [L. *torpĭdus,* benumbed, stupefied —from *torpērĕ,* to be still, to be stiff with frost: It. *torpido*]: benumbed; having lost the power of exertion and feeling; dull; inactive; dormant; stupid. TOR'PIDLY, ad. *-lĭ.* TOR'PIDNESS, n. *-nĕs,* or TORPIDITY, n. *tŏr-pĭd'ĭ-tĭ,* numbness; inactivity; sluggishness. TORPES'CENT, a. *-pĕs'sĕnt* [L. *torpesco,* I become stiff]: becoming torpid. TORPES'CENCE, n. *-sĕns,* torpidness; stupidity. TORPIFY, v. *tŏr'pĭ-fī* [L. *facĭō,* I make]: to make torpid. TOR'PIFYING, imp. TOR'PIFIED, pp. *-fīd.* TOR'PITUDE, n. *-tūd,* in *OE.,* torpidity. TOR'POR, n. *-pŏr* [L.]: numbness; dulness; inactivity; deficient activity. TOR'PORIF'IC, a. *-ĭf'ĭk* [*facĭō,* I make]: tending to produce torpor.—SYN. of 'torpid': dull; inactive; sluggish; numb.

TORQUAY, *tawr-kā',* or *tawr-kē':* watering-place on the s. coast of Devon, England; occupying a cove on the n. side of Tor Bay, 23 m. s. of Exeter, 220 m. w.s.w. of London. The name is from the Celtic 'Tor' (q.v.), a hill, which occurs in the appellations of the neighboring peaks of Dartmoor (Hey Tor, Rippon Tor, etc.), and thence is given to the bay, and to the ancient parish of Tormoham or Tormohun, in which Torquay is situate. The monastery of Tor Abbey was founded in the 12th century; but the town of Torquay is of recent origin. The bay is noted in history as the place where William of Orange landed 1688, and was often used as a naval rendezvous during the war with France; but till the beginning of the 19th century Torquay was little more than an assemblage of fishermen's huts. About that time, the advantages of its climate—which are a peculiarly sheltered position, an equable temperature, and freedom from fogs—made it a resort for consumptive patients; and it soon attained a European celebrity, still almost unrivalled. The romantic hills and valleys of Tormoham and its environs are being rapidly overspread with villas, gardens, terraces, and rows of smaller dwellings. The original parish has been divided into four, and possesses six (Anglican) churches, one Roman Catholic, one Scotch Presbyterian, and several dissenting chapels. A stone pier was built 1803, and the port is resorted to by colliers and small traders. The geological formation consists mainly of a range of transition limestone cliffs in strata much contorted, containing beautifully tinted marbles: there are also Old Red Sandstone and argillaceous shale. The scenery is exceedingly varied and picturesque. Besides the mildness of the winter, the vicinity of the sea in front, and of Dartmoor in the rear, greatly moderates the summer climate, so that, while the mean winter temperature is 44°, that of the summer is only 55°. Kent's Cavern, discovered 1824, and the Brixham Cave, discovered 1858, are rich in fossils, and are among the earliest places in the kingdom in which prehistoric human remains have been found.—Pop. of the urban sanitary district—Torquay and Tormoham—33,625.

TORQUE, n. *tŏrk,* or TORQUES, n. *tŏr'kwēz* [L. *torquc,* a twisted neck-chain—from *torquĕō,* I twist]: favorite ornament of the ancient Britons, consisting of a collar for the neck, formed of a spirally twisted bar of gold, bent round almost to a circle, with the ends free, and terminating in hooks or sometimes in serpents; in *mechanics,* the twisting effort, rotating effort, or mechanical couple exerted by a motor at a shaft. Often measured in pounds' weight at 1 ft. radius. TORQUED, a. *tŏrkt,* in *her.,* wreathed.

TORQUEMADA, *tŏr-kā-mâ'thâ,* TOMAS DE: inquisitor-general of Spain: about 1420-1498, Sep. 16; b. Torquemada, Spain. Having entered the order of Friars Preachers (Dominicans), he became prior of the convent of Santa Cruz in Segovia. He was chosen by Ferdinand and Isabella inquisitor-gen. for Castile and Leon 1483. Torquemada, though not the first Spanish inquisitor (the office dates from 1480), was the efficient organizer of the Holy Office in Spain. He was pres. of the Holy Office, and sat in the Consejo de la Suprema, or highest court of inquisition, assisted by six apostolical counselors, a procurator fiscal, three secretaries, a head-policeman, a treasurer, two reporters, and as many consulters as he might call. There were, besides the Consejo de la Suprema, four local tribunals. Torquemada drew up a code of procedure for the Holy Office, consisting of 28 articles. Of these, arts. 1-10 deal with summonses to heretics to come forward and confess; 11-13 with penitents; 14-19 treat of the procedure of trial, including torture; 20 and 21 extend the jurisdiction of the Holy Office to the dead. The rest of the articles treat of matters of detail. See INQUISITION.

TORREADOR. See TOREADOR.

TORRE DEL GRECO, *tor'rā dĕl grā'kō:* city of s. Italy, at the base of Vesuvius, 7 m. s.e. of Naples. The town is always new, being from time to time destroyed by the lava, and always raised again from its ruins by the attachment of its inhabitants to their native soil. The soil is fertile, producing fruit and wines similar to those of Greece. Its inhabitants are engaged in the tunny, oyster, and sardine fisheries. Mention is made of the town under its present name (the origin of which is unknown) as early as 1324. It suffered much in the eruption of 1631, and in that of 1794 it was almost totally destroyed by the lava. The earthquake of 1856, and the eruption of 1861, when the town was overwhelmed by vast showers of ashes, were equally destructive. But Torre del Greco has always risen again from its ruins.—Pop. 33,299.

TORREFACTION. See under TORREFY.

TORREFY, v. *tŏr'rĕ-fī* [F. *torréfier,* to torrefy—from L. *torrĕō,* I dry or burn; *facĕrĕ,* to make: Skr. *tarsha,* thirst]: to dry with heat; to roast or scorch; to parch or

dry highly on a plate of heated metal or porcelain, as a drug. TOR'REFYING, imp. TOR'REFIED, pp. *-fīd.* TOR'REFAC'TION, n. *-făk'shŭn* [F.—L.]: the operation of drying or scorching by a fire; the state of being roasted or dried. TOR'REFIED-GRAIN, n. in *chem.*, cereals, e.g., barley, maize, rice, etc., which have been submitted for a short time to a relatively high temperature, by which the natural moisture of the grain is suddenly expelled, and in the act of escaping distends each kernel: it is sometimes called white malt, and is used for brewing purposes and for feeding cattle.

TORRENS, *tor'rĕns,* LAKE: sometimes a brackish lake, at others merely a salt-marsh, in South Australia; lat. 30° 11′—32° s.; long. 137° 30′ e.; 30 m. n. of Spencer Gulf; length 130 m.; breadth 18 to 20 m.

TORRENS LAND SYSTEM: a system of title registration devised by Sir Robert Torrens, and first successfully used in Australia. Its object is to make the transfer of landed property as simple and as safe as that of any other property and to do away with the necessity of repeated title examinations. The system is operated through a bureau of registration, in charge of a registrar, and becomes effective on the first transfer of any property after the establishment of the system, all land transactions being registered in this office. A title may be registered as absolute or as possessory. Before registry the title is fully investigated by the registrar, who receives from the owner all the documentary evidences of title, descriptions of boundaries, etc. When the registrar is satisfied that the title is perfect, he files away all these old papers and issues to the holder a certificate of ownership, a duplicate of which is filed in the registrar's office. Such certificates bear on their faces notice of all incumbrances on the property. If the estate is vested in fee simple the title is known as 'absolute' and the certificate is stated to be an absolute certificate. Should it appear that an absolute title to any land can be held only for a limited period or subject to reversions, then the registrar will except from the effect of registration any estate right or interest arising before the specified date or under the conditions named, all of which will be entered in the register and noted on the certificate, which is stated to be a 'qualified' certificate. In the case of a 'possessory' title the applicant is registered as becoming owner or giving such evidence of title as may be prescribed, and the registration of any person as first owner with a possessory title only will not interfere with the enforcement of any estate right or interest adverse to the title that may then exist or which may arise at a later date. And this fact is noted on the 'possessory' certificate issued to the owner. This examination and registration of title does not have to be repeated after a certificate has once been issued, the transfer of the certificate with

accompanying entry of that fact in the registrar's office completes the transaction. By this method the transfer of a land title certificate becomes as simple and as inexpensive as the transfer of a certificate of stock or of a bank share, and the holder of the title is absolutely free from the usual danger of land title transfers, such as flaws in the title, the neglect of obscure future conditions, etc. Should any person suffer loss through misdescription, omission, or any other error in the certificate issued by the registrar, he is indemnified from an insurance fund created for that purpose. This fund is provided by the imposition of a tax of one fourth of one per cent on the value of the land at the time of the first certificate of title being granted, in addition to the registration fees. The registrar is the judge in all cases as to the liability of the fund to such compensation. The fees for registration under the Torrens system are very small, usually being $24 in case of the first registration, and $3 upon the issue of every subsequent certificate.

The Torrens system is in use in Australia, Tasmania, New Zealand, British Columbia, Ontario, many parts of continental Europe and in Massachusetts, Illinois, Minnesota, and New York in the United States. Since the original Torrens act gave a judicial and discretionary power to the registrar not in conformity with the spirit of American institutions, this portion of the law has been slightly changed in order to adapt it to the requirements of the latter country.

TORRENT, n. *tŏr'rĕnt* [F. *torrent,* a torrent—from L. *torrens* or *torren'tem,* burning—said of streams, raging, rushing—from *torrērĕ,* to burn]: a rapid-rushing stream, as lava or water; a stream of water running over a precipice or declivity; a very heavy fall, as of rain; a violent or rapid flow; a raging flood: ADJ. rolling or rushing in a rapid stream.

TORRES STRAIT: the narrow channel which separates Australia and Papua. From Cape York on the n. coast of Australia to New Guinea it measures about 80 m. Navigation is unsafe owing to the shoals, islands and reefs within its waters. It was discovered in 1606 by a Spanish navigator from Peru.

TORRES VEDRAS, Portugal: a town in the district of Lisbon, situated on the railroad, 20 m. n. of Lisbon. It is noted for its extensive lines of fortifications, 28 m. long, and reaching to the Tagus river. They were begun in 1809, and behind them Wellington in 1810 checked the French advance toward Lisbon. Pop. (1900) 6,891.

TORREY, *tŏr'ĭ,* BRADFORD: American naturalist and author: b. Weymouth, Mass., 1843, Oct. 9. He was educated in the public schools, taught two years, entered business in Boston, and from 1886 has been a member of the editorial staff of the *Youth's Companion.* He has been well ranked as a field ornithologist, and writes en-

tertainingly of his observations. His essays have been collected into the following volumes: *Birds in the Bush* (1885); *The Foot-Path Way* (1892); *A Florida Sketch-Book* (1894); *Spring Notes from Tennessee; A World of Green Hills* (1898); *Every-Day Birds* (1900); and *Footing It in Franconia* (1900); *The Clerk of the Woods* (1903); *Nature's Invitation* (1904); *Friends on the Shelf* (1906); etc.

TORREY, Charles Turner: American antislavery reformer: b. Scituate, Mass., 1813, Nov. 21; d. Baltimore, Md., 1846, May 9. He was graduated at Yale in 1830, entered the Congregational ministry, and held pastorates at Princeton, N. J., and Salem, Mass. Having removed to Maryland to promote the cause of anti-slavery, he became an active agent of the Underground railroad, and was arrested and imprisoned in 1843 for his report of a slaveholders' convention held in Baltimore. The following year he was again arrested, and being convicted of aiding in the escape of runaway slaves, he was sentenced to a long term in the penitentiary. The harsh treatment he received while undergoing his sentence brought on consumption, from which he died, and his remains were taken to Boston, where he was honored by a public funeral. He was regarded as a martyr in the cause of abolition, and 'Torrey's blood crieth out,' became an anti-slavery watchword. He wrote *A Memoir of William R. Saxton* (1838), and while in prison produced a volume of sketches of Massachusetts life, *Stone, or the Pilgrim's Faith Revived* (1846). Consult: Lovejoy, *Memoir of the Martyr Torrey* (1847).

TORREY, John: American botanist: b. New York 1796, Aug. 15; d. there 1873, Mar. 10. He received his first instruction in botany, mineralogy, and chemistry from Amos Eaton, and was graduated at the New York College of Physicians and Surgeons in 1818. His leisure from medical practice he devoted to scientific pursuits, particularly to botany, and in 1824 he abandoned medicine and became professor of chemistry, mineralogy, and geology at West Point. From 1827 to 1855 he was professor of chemistry and botany at the College of Physicians and Surgeons, serving simultaneously terms as professor of chemistry at Princeton, 1830-54, and of chemistry, mineralogy, and botany at the University of the City of New York, 1832-3. From 1853 until his death he was chief assayer in the United States assay office, New York. He participated in the councils of Columbia College as trustee, and in 1860 presented to that institution his extensive herbarium and botanical library. In his special field of scientific research his publications were numerous. One of his earliest was a *Catalogue of Plants Growing Spontaneously Within Thirty Miles of the City of New York* (1819), which he prepared for the New York Lyceum of Natural His-

tory, of which he was a founder and for many years president. This body has since developed into the New York Academy of Science. In 1824 he began the publication of *A Flora of the Northern and Middle States,* but he did not carry the work far, owing to the fact that the Jussieu system of classification was coming generally to supplant that of Linnæus, upon which the work was planned. In 1843, as botanist of the Geological Survey of New York, he published an elaborate work on the flora of that state. Meantime he had issued in connection with Asa Gray parts of a work on *The Flora of North America;* but this was also discontinued after the completion of the order *Compositæ.* Another work in association with Gray, also uncompleted, was a report on the botanical collections made by the Wilkes exploring expeditions. From 1845 onward he published memoirs and reports on the botanical specimens brought back by expeditions to various parts of the w. and s. by Capt. John C. Frémont and others, among them being reports on the botany of the expeditions for ascertaining the most practicable route for a Pacific railroad and making the Mexican boundary survey. He was president of the American Association for the Advancement of Science in 1855, and was named by congress in 1863 one of the original members of the National Academy of Sciences.

TORREY, Joseph: American clergyman: b. Rowley, Mass., 1787, Feb. 2; d. Burlington, Vt., 1867, Nov. 26. He was graduated at Dartmouth in 1816 and at Andover Theological Seminary in 1819. He was for a time pastor of a Congregational church at Royalton, Vt., but in 1827 became professor of Greek and Latin at the University of Vermont. In 1842 he took the chair of philosophy there, and in 1862-6 was president of the institution. He translated Neander's *General History of the Christian Religion and Church* (1854), and edited *Remains of President James Marsh* (1843) and *Select Sermons of President Worthington Smith* (1861). A volume of his lectures, *A Theory of Fine Art,* appeared posthumously (1874).

TORREY BOTANICAL CLUB: a botanical society in New York which is the most important organization of its kind in America, and one of the six scientific societies affiliated in the Scientific Alliance. The club was an outgrowth of a former club, chartered in 1871, although the first *Bulletin* was published a year before. This earlier organization arose from previous informal meetings of a group of botanical collectors, who gathered as early as 1858, for field-work on the local flora. This band met in the herbarium of Columbia College, 'drawn there by the genial welcome and wide botanical knowledge of its presiding spirit, Dr. [John] Torrey,' and was the nucleus of the present club, finally organized under its present name, complimentary to Dr. Torrey, in 1873. Dr. Torrey

was the first president, but unfortunately, died almost immediately. The valuable herbarium of the club includes the material for this list, and specimens of the flora, within the same area. It is now deposited at the New York botanical garden, which was originated and developed by members of this society. The club issues three regular publications, namely: *Bulletin,* a very scientific and widely known journal; *Torreya,* of more popular scope; and *Memoirs,* which include many valuable monographs.

TORREYA, *tŏr'ĭ-a* [named after John *Torrey,* botanist]: genus of *Coniferæ,* tribe *Taxeæ,* comprising several species of evergreen exospermous trees native in N. America, China, and Japan. The leaves, which are linear or lanceolate, are in two ranks; flowers diœcious, the male flowers solitary, the female in twos or threes. The fruit is ovoid, drupaceous, and sometimes 1½ in. long. The American species are *Torreya taxifolia* (Stinkcedar), of Florida, and *Torreya Californica* (California nutmeg).

TORRICELLI, *tor-rē-chĕl'lē,* Evangelista: Italian mathematician and philosopher: 1608, Oct. 15—1647, Oct. 25; b. Piancaldoli, in the Romagna, Italy. He was brought up by an uncle, who resided at Faenza, and who put him under the tuition of the Jesuits. When 20 years old, he was sent to Rome, and there pursued mathematical studies. Galileo's theories on force and motion, published a short time before, especially engaged his attention, and led to his publishing a *Trattato del Moto* (1643), and this led to his being invited to visit Galileo; and on the old philosopher's death, three months afterward, he was appointed to succeed Galileo in the chair of philosophy and mathematics at Florence. There he resided till his death. The discovery which will preserve Torricelli's name through all ages was the interpretation of the previously known fact that water will rise in a suction-pump to the height of only about 32 ft. The fact that water *could* be raised in a pump was expressed by the empirical law that 'nature abhors a vacuum,' and after the limit of 32 ft. was ascertained, the law was modified accordingly by Galileo. Torricelli, wishing to perform this experiment more conveniently, employed mercury, and found that nature's abhorrence of a vacuum varied for different fluids, and was represented by a column of fluid in height inversely proportional to its specific gravity; here, then, was an additional fact of great importance, containing the clew to the mystery; and Torricelli was not long in hitting on the idea that the column of fluid was sustained by the pressure of the atmosphere on the open surface of fluid. The vacuum included in the mercurial barometer is known as the Torricellian Vacuum: see Barometer. Torricelli also effected the quadrature of the cycloid, but in this was anticipated by Roberval.

TORRICELLIAN, a. *tŏr'rĭ-chel'lĭ-ăn:* of or discovered by *Torricelli,* a famous Italian philosopher and mathematician, born 1608, to whom is due the merit of discovering the principle of the barometer. TORRICELLIAN VACUUM, the vacuum formed above the mercury in the barometer; any similar vacuum.

TORRID, a. *tŏr'rĭd* [F. *torride*—from L. *torrĭdus,* dried up, parched—from *torrērĕ,* to burn: It. *torrido*]: parched; dried with heat; burning; hot; sultry. TOR'RIDNESS, n. *-nĕs,* the state of being parched with heat. TORRID ZONE, the middle zone or belt of the earth's surface, extending on each side of the equator to the tropic of Cancer on the north, and the tropic of Capricorn on the south—so called from its high temperature.

TORRINGTON, *tŏr'ĭng-ton:* Connecticut, borough in Litchfield co.; on the Naugatuck river, and on the New York, New Haven & Hartford railroad; about 23 m. w. of Hartford and 18 m. n. of Waterbury. Settlements were made in the vicinity in the early part of the 18th century, and in 1740 Torrington was incorporated. In 1887 it was chartered as a borough. It is the birthplace of John Brown (q.v.). The borough has a number of manufacturing establishments; chief among which are bicycle and machine shops, plating-works, brass-works, woolen mills, and novelty works. It also manufactures needles, hardware, and tobacco products. The number of manufacturing establishments, in 1900 (government census), was 108; the amount of capital invested in manufactories, $6,544,511; the number of employees, 3,522; the average annual wages, $1,704,291; the cost of the material used in one year, $6,687,684; and the annual value of the products, $10,017,121. The principal public buildings are the churches, schools, and the Y. M. C. A. building. The educational institutions are a high school, public and parish schools, several private schools, and a public library. There are two banks. The borough is the commercial and industrial centre of the town of Torrington, which contains 12,453 inhabitants. Pop. of the borough (1910) 15,483.

TORSADE, n. *tŏr-sâd'* [F., a twisted fringe—from L. *torquērĕ,* to twist]: something rolled or twisted, as ribbons, the hair, etc.; a lady's hair arranged in loose fancy rolls.

TORSE, n. *tawrss* [F. *tors,* twisted—from L. *tortus,* pp. of *torquērĕ,* to twist]: in *her.,* a wreath; a twisted scroll. TOR'SEL, n. *-sĕl,* anything in a twisted form.

TORSE. See TORSO.

TORSEL, or TORSAL, n. *tawr'sĕl* [etym. doubt.]: short beam under the end of a girder, where it rests on a brick wall.

TORSION, n. *tŏr'shŭn* [F. *torsion*—from mid. L. *torsĭō* or *torsĭōnem*, a twisting or wringing—from L. *tortus*, pp. of *torquērĕ*, to twist]: the act of turning or twisting; the twisting or wrenching of a body by the action of a lateral force: in *surgery*, a method of checking arterial hemorrhage in certain cases, by drawing out the end of the artery for about a quarter of an inch with a pair of forceps, and then twisting it round several times until it cannot untwist itself. TOR'SIONAL, a. *-ăl*, pertaining to torsion. TOR'TILE, a. *-tĭl*, twisted; wreathed; coiled. TORTIVE, a. *-tĭv*, twisted; wreathed. TORSION BALANCE, instrument invented by Coulomb, in which the force exerted by a twisted thread or filament to recover its original position, is made the means of measuring minute degrees of electrical and magnetical attraction: see ELECTRICITY. It has been used also in determining the mass and density of the earth (q.v.).

TORSK, n. *tŏrsk* [Dan. *torsk*, a species of cod-fish]: the hake-fish, a kind of cod of the genus *Brosmius* (*B. vulgaris*), and family *Gadidæ* (q.v.), abundant in the n. Atlantic Ocean. The genus is characterized by a single long dorsal fin, and by having the vertical fins separate. The T. is 18 inches to 2 ft., rarely 3 ft. long; head small, body moderately elongated, one barbule under the chin, dorsal and anal fins distinct from the tail, though separated from it by a very short interval; tail rounded; head dusky; back and sides yellow, passing into white on the belly. It lives in deep water, approaching the land in shoals only at the spawning-time, very early in the year. It spawns among the sea-weed of the coast. It is caught in the same manner as cod, ling, etc.; and though rather firm and tough when fresh, is generally esteemed, when dried and salted, to be the best of stockfish. It is occasionally caught in the Firth of Forth, but belongs to more n. regions, and is very abundant in the Shetland Isles, the Faroes, on parts of the coast of Norway, and on the s. and w. coasts of Iceland: see HAKE.

TORSO, n. *tŏr'sō* [It. *torso*, the stump of a cabbage, a torso—from L. *thyrsus;* Gr. *thursos*, a stem]: the trunk of a statue; a statue deprived of head and limbs. Of such imperfect relics of classic art, the most famous is the *Torso of Hercules*, a masterpiece of manly beauty, discovered in the Campo del Fiore at the beginning of the 16th c., and placed, by order of Pope Julius II., in the Vatican.

TORSTENSOHN, *tor'stĕn-son*, LEONARD, Count of Ortala: the most enterprising and successful of the Swedish generals in the Thirty Years' War (q.v.): 1603, Aug. 17—1651, Apr. 7; b. Torstena. He became one of the royal pages 1618, and attended Gustavus Adolphus in his earlier campaigns. When Gustavus entered Germany 1630, T. was capt. of the body-guard; and his brilliant services at Breitenfeld, the Lech, and on other occasions, were rewarded with rapid promotion. Taken prisoner at the combat of Nuremberg (1632, Aug. 24), he was subjected to rigorous treatment, which ruined his health, so that on his exchange six months after, he returned to his post in the Swedish

army a confirmed invalid; yet a vigorous mind and energetic character so overmastered bodily infirmity, that though reduced to the necessity of being always conveyed in a litter, he proved himself a most able officer under Bernhard of Weimar and Baner, the successors of Gustavus. In 1641, on the death of his former chief, the chivalrous Baner, T. was appointed to chief command of the Swedes in Germany. His military career was marked by brilliancy of conception, fertility of resource, resolute daring, and above all by extraordinary rapidity of execution. Having recruited and equipped his army, he invaded Silesia, routed the Austrians at Glogau and Schweidnitz, reduced most of Moravia, and being pressed back into Saxony by the Archduke Leopold and Piccolomini, gallantly turned on the multitude of his pursuers (1642, Nov. 2), and on the field of Breitenfeld, where Tilly's reputation for invincibility was cast down in the dust by Gustavus, inflicted a bloody defeat on the same adversaries; he then resumed his invasion, and laid Moravia and Austria under contribution. Ferdinand III., despairing of protecting his territories from T., negotiated with Christian IV. of Denmark to make a diversion by invading Sweden; but T., with characteristic promptitude, left Moravia 1643, Sep., traversed Saxony and the Upper Palatinate, burst into Holstein, and in less than six weeks subjugated the Danish mainland. The Austrians under Gallas followed in pursuit of him, to aid their allies, but arrived too late; and in attempting to coop him up in Holstein, were routed, and driven into Saxony; and again totally defeated (1644, Nov. 23) at Jüterbogk, in attempting to bar his return into Bohemia. Gallas was now deposed; but a combination of eminent generals, Montecuculi, Goertz, and others, was equally ineffective against the resistless Swede, who, by a great victory at Yankovitz (1645, Feb. 14), secured the navigation of the Danube, and the possession of the hereditary countries n. of it. The emperor, empress, and principal nobility now deserted the capital; the Saxons again joined the Swedes; and the Danes, routed at sea as well as on land, besought peace, which was granted (1645, Aug. 13). At this time, when a few more of T.'s weighty blows would have completely unseated the Hapsburg family, his gradually increasing ailments compelled him to resign the command to one greatly his inferior, and retire to Sweden, where he had a most distinguished reception from Queen Christina, was created a count, and appointed to various high offices.

TORT, n. *tŏrt* [F. *tort*, wrong—from L. *tortus*, pp. of *torquĕrĕ*, to twist]: in *OE.*, mischief; calamity; in *law*, injury; damage; wrong. TORTIOUS, a. *tŏr'shŭs*, in *OE.*, injurious; doing wrong; in *law*, implying damage.—*Tort*, in law, is violation of rights pertaining to every person, simply as person—e.g., of the right to personal security, to liberty, to property, to reputation, to service of a minor son or daughter, to companionship of a wife or husband, etc. Hence an injury to person or property or reputation is a T.; and special instances of T. are deceit, libel, conspiracy, malicious prosecution, false imprisonment, abduction and

seduction, trespass, infringement of copyright or patent right or trade-marks, etc. The difference between T. and crime is that T. is an injury to an individual, while crime is injury to the state. And T. is distinguished from an act in violation of contract, in the points following: (1) that persons jointly committing a T. may be in many cases held severally liable without right to contribution from their fellows; (2) that the right of action for T. ceases with death of either party; (3) that persons not qualified to make contracts are liable for their torts. An action of T. must rest on clear proof of the relation of cause and effect between the act and the injury. Further, action of T. generally falls if the plaintiff's negligence has in any degree contributed to the injury.

TOR'TEAU: see ROUNDLE.

TORTILE, TORTIVE: see under TORSION.

TORTILLA, n. *tŏr-tēl'yă* [Sp.]: a thin unleavened cake of maize-flour, baked on a heated plate or stone.

TORTOISE, n. *tŏr'tĭs* [Prov. *tortesa;* F. *tortue;* Sp. *tortuga*—from mid. L. *tortuca*, a tortoise—from L. *tortus*, pp. of *torquērĕ*, to twist]: a chelonian reptile of the genus *Testudo*, more or less flattened, covered with a very hard shell or case, into which it can draw its head and feet at will; in *anc. warfare*, a Testudo (q.v.).—*Tortoise* is a popular name, used interchangeably with turtle, for any chelonian, though more frequently applied to land species than to aquatic; yet tortoise-shell is from a marine species. The genera are many. In *Testudo*, to which the name is often applied, the carapace is of a single piece, bulged, and attached by the greater portion of its lateral edges to the *plastron* (see CHELONIA); the legs are very short; toes very short, and united to the nails, which are thick and conical, five on the fore-feet and four on the hind-feet. The species are numerous and widely distributed, inhabitants of warmer temperate and of tropical countries. They all feed on vegetable food. Several species are found around the Mediterranean. The most common of these is the GREEK T. (*T. Græca*), which attains a length of 12 inches, and has a broad and equally bulged carapace; the scales of which are granulated in the centre, striated on the margins, and spotted or marbled with black and yellow. Of this species, an individual is mentioned by White, in *Natural History of Selborne*. It lives to a very great age, 100 years or more, as probably do all the other species, and spends the winter in a dormant state, as do all those which are not inhabitants of tropical climates; selecting a place of hibernation or preparing it by scooping a hole in the earth. During the heat of summer it feeds voraciously. The love-season, which is in the beginning of summer, is one of great activity; and tortoises express their amorous desires by striking their shells against those of their mates. The Greek T. is used for food in parts of S. Europe. The flesh of all species of T. appears to be good for food, and the eggs of all are regarded as delicacies. A very large species is the Indian T. (*T. Indica*), if several species are

not confounded under that name. It has been found on the coast of Coromandel four ft. and a half in length, its bulge being about 14 inches. It is particularly abundant in the Galapago Islands, and has even been supposed by Darwin to be originally a native of them, and to have been diffused thence by the buccaneers over other tropical regions. The Galapago T. is often 200 lbs. in weight. Its flesh is of excellent quality. It forms tracks from the arid districts near the shore to the high districts of the islands, where there are springs, for the purpose of drinking: it swallows a very large quantity of water at a time. The numbers of tortoises in some tropical and subtropical countries are very great.

For N. American species, see TURTLE.

Tortoises show very little intelligence; they are, however, capable of recognizing the hand that feeds them.

TOR'TOISE PLANT: see HOTTENTOT'S BREAD.

TOR'TOISE-SHELL: the large scales of the carapace or shield of a species of sea-turtle, *Chelonia imbricata* and *Testudo imbricata* of several authors—*Caretta imbricata* of Dr. Gray—found in the Indian Ocean, Amboyna, New Guinea, Seychelles, Havana, and the Red Sea, etc., and manufactured into various articles of ornament and use. T.-S. is so called because formerly the order of animals to which it belongs was little known, and all were confounded under the general name Tortoises. A remarkable peculiarity in this species is the arrangement of the 13 plates forming the carapace, which, instead of being joined together by their edges, so as to make apparently one piece, are thinned off at their edges, and overlap each other like the tiles of a roof. They vary in size according to the part of the shield that they occupy. The larger are sometimes 12 to 18 inches long, by 6 inches broad; the thickness rarely exceeds the eighth of an inch. This material has beautiful mottled color, and is semi-transparent. A remarkable quality, which greatly increases the usefulness of T. S. for ornamental purposes, is its property of being easily softened by a heat equal to that of boiling water, and of retaining any form when cold which has been given to it when heated. Pieces can also be welded together by pressure of hot irons. Its chief use is in making combs for the hair; but it is used also for inlaying small pieces of ornamental furniture and fancy objects.

TORTO'LA: see VIRGIN ISLANDS.

TORTONA, *tor-tō'nâ* (anc. *Antilia*, or *Dertona*). town of n. Italy, province of Alessandria, on the right bank of the Scrivia (a small river which flows n. to join the Po), and 13 m. e. of Alessandria, with which it is connected by railway. The principal buildings are the *Duomo* and church of San Francesco. T. has manufactures of silk, leather, hats, etc. It was a notable place in the middle ages—the old walls, and the ruins of a castle in which Frederick Barbarossa lived, being a relic of those turbulent times. Its fortifications were destroyed by the French, after Marengo, 1799.—Pop. 17,452.

TORTOSA, *tor-tō'sâ* (anc. *Dertosa*): old fortified town of Spain, province of Tarragona; picturesquely situated on a sloping eminence overlooking the Ebro, about 22 m. from the mouth of that river. The streets are narrow, and the place has altogether a dull look. Some inconsiderable manufactures are carried on, and the sturgeon and lamprey fisheries afford employment.—Pop. 23,302.

TORTUGAS, *tor-tō'gas* (Sp., Turtles): group of ten islets or keys, called also the Dry Tortugas, belonging to the United States: at the entrance of the Gulf of Mexico, 120 m. w.s.w. of Cape Sable, s. point of Florida. They are low coral islets, partly covered with mangrove bushes. There is a light-house on Bush Key; and on the same island stands Fort Jefferson, garrisoned by about 100 men. During the civil war, the fort was used as a penal station for Confederate prisoners.

TORTUOUS, a. *tŏr'tū-ŭs*, or TOR'TUOSE, a. *-ōs* [L. *tortŭōsus*, full of crooks or turns—from *tortus*, twisted; *torquĕrĕ*, to twist: It. *tortuoso:* F. *tortueux*]: twisted; winding; having many crooks and turns; crooked; disingenuous; deceitful, as a *tortuous* policy. TOR'TUOUSLY, ad. *-lĭ*. TOR'TUOUSNESS, n. *-nĕs*, or TOR'TUOS'ITY, n. *-ŏs'ĭ-tĭ*, state of being crooked and winding; wreath; flexure.

TORTURE, n. *tŏr'tūr* or *-chûr* [F. *torture*—from mid. L. *tortūra*, torture—from L. *tortus*, pp. of *torquĕrĕ*, to twist]: extreme pain; anguish of body or mind; agony; severe pain inflicted as a punishment, or for the purpose of extorting a confession: V. to pain extremely; to put to the rack; to torment; to harass; to vex. TOR'TURING, imp.: ADJ. tormenting; keeping on the rack; vexing. TOR'TURED, pp. *-tūrd* or *-chûrd*. TOR'TURER, n. *-tū-rĕr*, one who tortures. TOR'TURINGLY, ad. *-rĭng-lĭ*.—*Torture* has been (and still is) largely used in many countries as a judicial instrument for extracting evidence from unwilling witnesses, or confessions from accused persons. In ancient Athens, slaves were examined by T., and their evidence seems on this account to have been deemed more valuable than that of freemen. Any one might offer his own slave, or demand that of his opponent, to be examined by T.; and it was a presumption against any one that he refused to give up his slave for that purpose. No free Athenian could be examined by T., but T. seems to have been used occasionally in executing criminals. Under the Roman republic, only slaves could be tortured, and, as a general rule, they could not be tortured to establish their masters' guilt. Under the empire, T., besides being much used in examining slaves, was occasionally inflicted even on freemen, to extract evidence of the crime of *læsa majestas*. Cicero and other enlightened Romans wholly condemned its use. Until the 13th c. T. seems to have been unknown to the canon law; about that period, the Roman treason-law began to be adapted to heresy as *crimen læsæ majestătis Divinæ*. A decree of Pope Innocent IV., 1282, calling on civil magistrates to put persons accused of heresy to the T., to elicit confessions against themselves and others, was

probably the earliest instance of ecclesiastical sanction for this mode of examination. Afterward T. was largely employed by the inquisitors (see INQUISITION).

From the civil law, T. became a part of the legal system of most European countries. It was adopted early and largely by the Italian municipalities. In Germany, elaborate apparatus for its infliction existed, not only in the dungeons of the feudal castles, but in the vaults beneath the town-halls of Nuremberg and Ratisbon, where the various implements used are yet seen. It continued in the prisons of Germany when they were visited by Howard 1770. In France it was part of the judicial system till 1789; in Scotland it was in frequent use after the Restoration, and was only abolished by 7 Anne, c. 21, s. 5.

The use of T. seems always to have been repugnant to the genius of the law of England: though occasionally used by an exercise of prerogative, it may be doubted whether it was ever recognized as lawful in the ordinary administration of justice. Its first recorded use is in 1310, in aid of the ecclesiastical law, during the struggle between Pope Clement V. and the Templars. Edward II., when applied to to sanction the infliction of T. by the inquisitors in the case of certain Templars accused of heresy and apostasy, at first refused; but on remonstrance by Pope Clement, he referred the matter to the council; and on recommendation of the council, the inquisitors were authorized to put the accused to the T., but without mutilation or serious injury to the person, or effusion of blood. During the Tudor period, the council assumed the power of directing torture-warrants to the lieut. of the Tower and other officers, against state prisoners and occasionally also against persons accused of other serious crimes; and similar warrants were at times issued under the sign-manual. Under James I. and Charles I., T. was less frequent, and only in state trials. In 1628, in the case of Felton, assassin of the Duke of Buckingham, the judges declared the examination of the accused by T., for discovering his accomplices, to be illegal. T. was inflicted for the last time in England 1640, May. It is now disused in all countries of Europe, and is universally acknowledged to have been a most unsatisfactory mode of procuring true testimony, often leading the innocent, from mere weakness of body, to plead guilty.

The instruments of judicial T. have been various. The most celebrated is the Rack, an oblong horizontal frame, on which the accused was stretched, while cords attached to his legs and arms were gradually strained by a lever or windlass, an operation which, when carried to extreme severity, dislocated the joints of the wrists and ankles. The rack is as old as the 2d c. in s. Europe, but is said to have been unknown in England until introduced into the Tower by the Duke of Exeter, constable of the Tower, whence it acquired the name 'Duke of Exeter's Daughter.' In Germany the rack was sometimes furnished with a roller, armed with spikes, rounded off, over which the sufferer was drawn forward and backward A vertical rack also was in use in that country. The person subjected to it was

raised to the roof by a rope attached to his arms, which were bound behind his back; and two heavy stones having been attached to his feet, the rope was loosened so as to let him fall with a jerk to within a few inches of the ground. Among the lesser tortures were the Thumbikins, Boots, Pincers, and Manacles; and in England an instrument called the Scavenger's (properly Skeffington's) Daughter, the invention of Sir W. Skeffington, lieut. of the Tower in the reign of Henry VIII.

TORULA, n. *tŏr'ū-lă* [L. *torŭlus*, a tuft of hair—from *torus*, a bulge]: genus of fungi.—Tor'ula cerevis'iæ, the yeast-plant, one of the fungi connected with the process of fermentation (see Yeast). This plant (*Saccharomyces cerevisiæ*) may be readily observed by examining a little yeast under the microscope, when it will be seen in the form of round or oval corpuscles (cells), averaging $\frac{1}{3000}$ of an inch in diameter, and many having smaller corpuscles in their interior. They grow by protrusion of gemmules, and germinate sometimes on one and sometimes on several spots of the primitive fungus cells. These shoots throwing off new gemmules, the yeast-plant gradually forms single or branching rows of oblong cells, connected like beads. This peculiar arrangement of the cells, and the fact that they are not acted on by acetic acid, is characteristic of the plant.

This fungus exists in the saccharine urine of *diabetes mellitus*, after it has been discharged for 24 hours or longer, and its appearance in urine within a day or two is sufficient to lead to the suspicion of the presence of sugar. It is frequent likewise in vomited matters and in fecal evacuations; and, wherever found, it is indicative that the fluid is in a state of saccharine fermentation.

As fungi more or less closely resembling the yeast-plant often occur in non-saccharine urine that has stood for some days, the assumed presence of the T. cerevisiæ must not be taken as proof of the presence of sugar, though it affords a strong hint for testing for that substance.

TORULOSE: see under Torus.

TORUS, n. *tō'rŭs*, or Tore, n. *tōr* [L. *torus*, a thing swelling out, a bulge: It. *toro:* F. *tore*]: in *arch.*, a large convex molding in the bases of columns, the profile of which is semicircular (see Column): in *bot.*, the axis on which all the parts of the floral whorls within the calyx are seated. Torulose, a. *tŏr'ū-lōs'*, or Tor'ulous, a. *-ū-lŭs* in *bot.*, having successive rounded swellings, as the pods of some cruciferous plants; swollen and constricted alternately.

TORY, n. *tō'rĭ* [Gael. and Ir. *taobh-righ*, pronounced somewhat like *tō'rē* or *tă'rē*, the king's side—from *taobh*, side or part; *righ*, king: said by others to be from the Irish robber word *toree*, give me—i.e., your money—subsequently applied to Rom. Cath. outlaws in Ireland, then to those who refused to concur in excluding a Rom. Cath. prince from the throne]: originally, an Irish robber or outlaw; in *British politics*, a term opposed to *whig*—applied first in

1680 as a term of reproach to the members of the court party, which refused to concur in the measure introduced by the whigs for exclusion of the Duke of York, a Roman Catholic prince, from the throne; an adherent of the party which maintains certain traditional constitutional principles of public policy. Since the clergy of the Church of England taught the doctrines of passive obedience and the divine right of kings, they also were known under the name of tories. In modern English politics the successors of the tory party are known as conservatives, but the old term is not infrequently heard in parliamentary debate. Political parties in British colonies at times followed closely the divisions and names in England, so that in Australia and New Zealand the conservative elements in the representative assemblies were known as tories. In the *United States* the members of the British party during the revolutionary period were known as tories or loyalists. The estates of tories were in many instances confiscated; and many tories settled in Canada and other British colonies. TORY, a.: of or pertaining to the tories. TORYISM, n. *tō′rĭ-ĭzm*, principles of the tories.

TOSCHI, PAOLO: Italian engraver: b. Parma 1788; d. 1854. In order to perfect his engraving he went to Paris in 1808 to study under Bervic and remained there until 1819. In that year he returned to Parma and with a friend, Antonio Isac, established a school of engraving. In 1820 he was appointed director of the Academy of Fine Arts by Maria Louisa, Duchess of Parma, formerly Empress of France, and he greatly enlarged and improved the Academy. His most widely known works are from Corregio's *Madonna della Scodella;* Gérard's *Entrance of Henry IV. Into Paris* (1818); Raphael's *Spasimo* (Madrid); Daniele da Volterra's *Descent from the Cross;* and a series of Corregio's Parmesan frescoes.

TOSE, v. *tōz* [see TEASE 1, and TOUSE]: in *O.E.*, to tease, as wool.

TOSHACH, *tŏsh′ăch* [Celtic, 'captain']: among Celtic nations, the military leader of a clan or tribe, whose functions were in early times always separated from those of the supreme judicial officer. When the office of Toschach, originally elective, became hereditary, according to the principle of divided authority characteristic of Celtic communities, it remained permanently in the eldest cadet of the clan. See TANISTRY.

TOSS, v. *tŏs* [W. *tosio*, to jerk; *tos*, a toss, a jerk: Norw. *tossa;* Low Ger. *tösen*, to let drop, to scatter in small portions]: to throw with the hand; to throw upward; to lift or throw up with a sudden or violent motion; to fling; to pitch; to make restless; to disquiet; to roll and tumble; to be in violent commotion; N. act of tossing; affected manner of raising the head. TOSS′ING, imp.: N. the act of throwing upward; a rising and

falling suddenly; a rolling and tumbling. TOSSED, pp. *tŏst.* TOSS'ER, n. *-ėr,* one who tosses. TO TOSS OFF, to drink off without ceremony or delay; to make short work of. TO TOSS THE OARS, to raise them perpendicularly with their blades upward, as a salute. TO TOSS UP, to throw a coin up into the air and bet on which side it will fall. A TOSS-UP, an uncertainty. TO TOSS HAY, to throw up and turn it over. TOSS-POT, n. a toper; a drunkard. TOSSED BY A BULL, thrown up by his horns.

TOSTI, FRANCESCO PAOLO: Italian composer: b. Ortona di Mare 1827, Apr. 7. He was a pupil and later teacher at the Conservatorio Reale, Naples, and in 1869 appeared as a concert singer at Rome. Shortly afterward he became vocal instructor at the court; removed to London in 1875; and in 1880 was appointed instructor to the royal family. In 1908 Edward VII made him a knight. He produced *The Grand Duke* (opera, 1888); *La prima donna* (opera, 1889); and many English and Italian songs. His *Good-bye; For Ever and For Ever; That Day;* etc., have been widely popular, selling to the number of 1,000,000 copies of a single song.

TOS'TIG (TOSTI, TOSTINUS): West-Saxon warrior: d. 1066. In 1055 he was made earl of Northumbria, Northamptonshire, and Huntingdonshire, by Edward the Confessor. A stern ruler, he repressed feud and disorder by the exercise of a merciless justice (*patriam purgando talium cruciatu vel nece*), with no distinction of rank. In 1063 he joined his brother Harold in the invasion of Wales, but in 1064, for treacherous murder, was outlawed, while Morcar was chosen to the earldom (1065). He retired into exile in Flanders, in 1066 committed various depredations on the Isle of Wight, Lindesey, and the e. coast, and subsequently joined Harold Hardrada, king of Norway, in an invasion of England. They landed in Yorkshire, but were entirely overthrown by Harold and his household troops at Stamford Bridge. Tostig figures in Tennyson's drama of *Harold* (1877). Consult Green, *The Conquest of England* (1884).

TOT, v. *tŏt* [the syllables *tat, tot, tit,* are used in forming words signifying broken sound, then short abrupt movement, a small quantity: Icel. *tottr,* little: Norw. *tot,* a murmur: Icel. *titra,* to shiver: Dan. *tot,* a flock of wool]: anything small, as a term of endearment; anything small of its kind. TO TOT ABOUT, to move about with short steps, as a child attempting to walk, or a feeble old person. TOT'TY, or TOTTIE, a. *tŏt'tĭ,* unsteady; dizzy; small. TOT'TER, v. *-tėr,* to shake as if about to fall; to be unsteady; to shake. TOT'TERING, imp.: ADJ. threatening to fall. TOT'TERED, pp. *-tėrd.* TOT'TERINGLY, ad. *-lĭ.* TOT'TERER, n. *-ėr,* one who totters.

TOT, v. *tŏt* [contr. of TOTAL]: *familiarly,* with *up,* to sum; add; reckon, as to *tot up* the bill.

TOTAL, a. *tō'tăl* [F. *total*—from mid. L. *totālĭs*—from L. *totus*, all, whole: It. *totale*]: whole; complete, entire; undivided; absolute: N. the whole; the complete sum or amount. TO'TALLY, ad. *-lĭ*, wholly; completely. TOTALITY, n. *tō-tăl'ĭ-tĭ*, the whole sum or amount, wholeness; completeness. IN TOTO, *tō'tō* [L.]: in the whole; altogether. —SYN. of 'total, a.': whole; entire; perfect; integral; complete.

TOTAL ABSTINENCE FROM ALCOHOLIC BEVERAGES: one of the steps in the movement for suppression of intemperance. This reform has passed, in America, through a series of well-defined stages. The first temperance societies (see TEMPERANCE MOVEMENT) were organized to discourage the 'too free use' of ardent spirits. In a brief time, entire abstinence from ardent spirits was urged. Later still (1836), the reformatory force of the 'moderation' movement having apparently spent itself, the advance was made to T. A. from all intoxicating drinks (including beer, ale, wine, and cider). The next stage (1840–44) may be said to have begun with the Washingtonian movement, the first general effort to reclaim drunkards. Then (1844–48) came the local option movement, in which the power of law was invoked on an extended scale; and this was followed (1851–56) by the era of Prohibition (q.v.). In each case the change made was to a more radical basis, and was made not from mere choice, but was apparently forced on the leaders of the movement by what they felt to be its logical and historical development.

History.—The T. A. movement was fairly inaugurated in 1836, when the National Temperance Convention, assembled in Saratoga Springs, N. Y., adopted, after much warm discussion, a resolution in favor of 'total abstinence from all intoxicating liquor as a beverage' (Dorchester's *Liquor Problem in All Ages*, 264). Prior to this, many local and even state societies had placed themselves on the same basis, and the action of the National Convention was the result of several years of agitation. The movement, by this advance, aroused new and formidable opposition. Not only was that of the makers, sellers, and drinkers of wines, beer, and cider, incurred, but a number of the friends of temperance regarded the step as extreme and likely to produce an unfavorable reaction. This antagonism appears, however, to have been confined to individuals, the temperance organizations as a rule indorsing the position without further hesitation. At this time the number of temperance societies in the United States had reached about 8,000, with estimated enrolment of 1,500,000 (*Permanent Temperance Documents*, 474). In the period 1838–40, according to Dorchester, 'the tide of reform' 'came nearly to a stand.' Evidence is lacking as to the reason of this; but it was due probably to the new and strong opposition engendered, and perhaps to hesitation and distrust of the wisdom of the new basis adopted. In Ireland, however, the new movement, under the inspiring leadership of Father Mathew, advanced with rapid strides, about 9,000 persons enrolling their names in the first nine months of

his labors (Burns's *Temperance History*, I. 139); and in 1840 the most remarkable uprising yet witnessed—the Washingtonian movement—began in the United States. This movement had its beginning in a public-house (Chase's Tavern) in Baltimore, being started by a club of six tipplers, who for some reason suddenly pledged each other to T. A., and organized the Washington Society, 1840, Apr. 2. In one year's time the society numbered in its membership 1,000 reformed drinkers. In 1841 and 2, immense meetings were held in the largest cities, and thousands were pledged. In the three years during which the movement lasted, it is estimated that 600,000 drunkards were induced to reform, 'of whom 450,000 returned to their old habit.' (*Liquor Problem in All Ages*, 271). The movement was emotional rather than educational. It aroused the country, however, as nothing else had done, and resulted in the formation of secret temperance societies, which have been ever since permanent educational organizations. To this movement was due the reformation of John B. Gough (q.v.), who at once, 1842, began his wonderful caree as a temperance apostle, a career which lasted until his death 1886.

Before the Washingtonian movement had ended, the energies of the temperance advocates had been directed, with increasing vigor, toward the laws relating to the liquor traffic. While the activities of 30 years had achieved results not inconsiderable, it was felt and acknowledged that, in comparison with the evil remaining, those results were very unsatisfactory. Almost from the beginning, strong protests against the license laws were uttered, and in 1844 these protests had assumed the form of organized action. From 1844 to the opening of the civil war, the aggressive work of the temperance advocates in the United States was directed chiefly toward the repeal of those laws and a reversal of the attitude of government from one of protection for the business to one of prohibition (see PROHIBITION). The educative work was continued, probably even intensified; but it no longer stopped at the duty of the individual in relation to his personal habits: it went farther, and arraigned the state and the citizen as participators in the responsibility.

The years of the civil war, the five years preceding, and the five subsequent years, composed a retrograde period. In the agitated condition of the country before and during the war, other issues likely to divide the support of the government were remanded to the rear. The moral and social demoralizations incident to a great war, the need of large revenues and the discovery of the ease with which they could be raised by taxes on liquor, the rapid growth in the brewing industry and the organization of its promoters, and the rapid influx of foreign immigrants—all conduced to the reaction. The close of the war found most of the prohibitory laws either repealed or unenforced. The mind of the public, relieved of the stress and strain of war, was soon called to grapple with almost equally important problems of reconstruction; and while the temperance activities were at no time suspended, they were more

than counterbalanced by adverse influences. This retrograde movement received its first decided check toward the close of 1873 by the Women's Crusade. This was a remarkable movement inspired by Dr. Dio Lewis, which began in Hillsboro, O., and spread into a large number of states, creating for a time intense excitement. Women of social influence and refinement organized themselves into praying bands which went to saloon after saloon, not forgetting drug-stores and taverns, and endeavored by prayer and persuasion to secure from the seller of intoxicating drink a pledge to cease the sale. Out of this uprising, necessarily transient, but powerful in its influence, was born the Woman's Christian Temperance Union (q.v.), probably the most powerful temperance soc. ever formed. About the same time (1874), the Red Ribbon movement (afterward the Blue Ribbon movement) was inaugurated in Maine. This was a repetition in most respects of the Washingtonian movement. The principal figures in it were Dr. Henry A. Reynolds, a reformed drinker, and Francis Murphy, a reformed drinker and saloon-keeper. This reform work was kept alive by reform clubs, by the secret temperance societies, and by the gospel temperance meetings held by the Woman's Christian Temperance Unions, and is at the present time an important branch of the temperance work. In 1880 the Prohibition movement again set in (see PROHIBITION).

Total Abstinence Societies.—The more important of these are the Independent Order of Good Templars, organized 1851, and numbering (1890) about 12,000 lodges and 600,000 members in America, Europe, Asia, Africa, and Australia; the Sons of Temperance, organized 1842, and numbering (1890) about 1,600 subordinate divisions and 85,000 members in N. America; the National Temperance Soc. and Publication House, organized 1865; the National Woman's Christian Temperance Union, organized 1874, with a membership (1890) of about 150,000, not including the juvenile department; the World's Woman's Christian Temperance Union, organized 1883; the Catholic Total Abstinence Union, organized 1872, and enrolling (1890) about 56,000 members. In addition, there is in most of the states some form of a state temperance society, and there are many societies organized in connection with churches.

Total Abstinence in Other Countries.—The impetus given to T. A. by Father Mathew, in Ireland, exerted an immediate effect throughout the United Kingdom. Societies had been organized some years before (1830–1) in Ulster, Glasgow, Bradford, and London; but, like the societies in America till that time, were based on 'moderation.' The first T. A. soc. was organized in the town of Preston, Lancashire, England, 1832, Joseph Livesey being the prime mover. Two years later 150,000 members were enrolled in similar societies. By 1841 the temperance movement had placed itself, throughout the United Kingdom, on the T. A. basis. At the World's Temperance Convention, London 1846, it was estimated that there were connected

with T. A. societies, in America, 7,000,000 members; in Ireland, 5,000,000; in England and Scotland, 3,000,000; on the continent of Europe and in the Brit. colonies, 3,000,000. The work in the United Kingdom has made steady progress, but on the educative rather than the political or legislative line. The principal T. A. societies are: National Temperance League, organized 1856; British Women's Temperance Assoc., 1876; Irish Temperance League, 1858; Scottish Temperance League, 1844; the Independent Order of Rechabites, 1835; the Good Templars; the Sons of Temperance; and the United Temperance Order. The juvenile organizations are the juvenile branch of Good Templars and the United Kingdom Band of Hope Union. The United Kingdom Alliance, organized 1853 for legislative work, has of late years been very active and influential, chiefly in securing the passage by parliament of the 'local veto" bill, giving to localities the right to determine whether or not licenses for public houses shall be issued—similar to the local option laws of the United States. It does not require T. A. of its members, but its teachings and its legislative demands are predicated on the T. A. principle. The Church of England Temperance Soc. has two sections, one consisting of total abstainers, the other of total abstainers and 'moderate' drinkers who are willing to co-operate for social and legislative purposes.

Argument for Total Abstinence.—This is twofold—moral and scientific: the former argument rests, however, to a considerable degree on the latter. The effects of alcohol, it is claimed, on the human system are so cumulative and so deceptive that there is but one safe rule to be followed or taught. While many may be able to drink sparingly and with self-restraint, it is pointed out that no individual has a sufficient knowledge of his own physical nature to be able to decide whether or not he can drink without in time becoming bound in the chains of habit. Great emphasis is laid on the evil effects which the example of 'moderate' drinking is believed to exert upon the young; and in this respect the influence of the 'moderate' drinker is pointed to as more dangerous (because more attractive) than that of the inebriate. The teaching of Paul (I Cor. viii. 13) is cited in this connection as obligatory—in principle—on the Christian to-day: this citation, however, has called forth strong dissent. In further opposition to this view, the Bible is quoted to show that alcoholic wine was drunk by Christ and his followers, and was often used in the Old Testament to typify a blessing. In response the theory has been advanced that two kinds of wine are spoken of in the Scriptures, one being the fermented, the other the unfermented juice of the grape, the terms *yayin* (Hebrew) and *oinos* (Greek) being generic terms, covering both kinds of wine, and the term *tirosh* (Hebrew) being a specific term used to designate unfermented wine only: this also is strongly denied by many eminent biblical scholars. Many, however, who reject the two-wine theory advocate T. A., claiming that Christ's diet is in no respect obligatory on Christians, and that,

whatever may have been the social or other effects of such a diet in that day, the evil consequences resulting from it now render T. A. obligatory on those who would follow the spirit of Christ's teachings. This view is very largely accepted in most of the evangelical denominations in America.

The scientific argument is, in brief, that alcohol is an irritant poison which serves no useful purpose in any healthy system. The controversy on this point dates back to 1842, when Baron Liebig, in his classification of foods, placed alcohol in the list of respiratory or heat-producing foods, expressly stating that it could not be a structure-building food. This classification was accepted until, 30 years later, Lallemand and Perrin, of France, claimed to have demonstrated by a series of experiments that alcohol was eliminated from the human system unchanged by combustion or any other process; and that none of its derivatives, such as aldehyde and acetic acid, such as would be produced by combustion, could be traced in the system. Their conclusion that alcohol was an intruder in the body was in turn accepted until the experiments of Austie, Thudichum, Schulinus, and Dupré, which seemed to indicate that but a portion of the alcohol was eliminated unchanged, the rest disappearing in the system and presumably being used in heat-production. Later still, however, Dr. Benjamin W. Richardson (q.v.), following on the same track that Dr. N. S. Davis, of Chicago, had pursued, by a series of elaborate experiments seemed to show that the result from the use of alcohol was a lowering of the temperature, instead of the contrary. Since then the ground of dispute has shifted. It is now claimed that alcohol, while not a direct food, serves the same purpose indirectly by retarding the destruction of tissues which is one of the invariable effects of vital processes. This, again, is disputed. It is urged that, while the elimination of the waste tissue is obviously retarded, its destruction is not shown to be retarded; and that in any event, since both the destruction and the elimination of these tissues are a natural part of the vital process, the retardation of either would be injurious, not beneficial. So far as any results have been reached from the controversy, they may be safely said to be comprised in the statement by Dr. Willard Parker that alcohol has no place in a *healthy* body. Even its defenders, moreover, claim that it is of dietetic benefit only when taken in doses much smaller in amount than that contained in an ordinary 'drink' of anything but very light wines or beers. None of the T. A. societies, it may be added, pledge their members against the use of alcohol or alcoholic liquors as a medicine, taken on the advice of a physician.—See ALCOHOL: FOOD AND DRINK.

Another argument of considerable force is derived in behalf of T. A. from the results of experience on the part of life insurance and mutual benefit societies—the rate of mortality among total abstainers being materially less than

that among 'moderate' drinkers.—See TEMPERANCE MOVEMENT: also references under it.

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TOTAL LOSS: in marine insurance, total loss may mean that the subject insured has been absolutely destroyed by the peril against which it was protected, or it may mean that the loss by damage, seizure, or other causes has been so great as to be practically absolute. In the latter case it is often termed a 'constructive total loss.'

TOTA'RA, or TOTARRA: a tree (*Podocarpus totara*), of New Zealand, of the yew family, excelled only by the kauri for general utility, and most abundant in the central part of North Island. It is from 60 to 80 ft. in height, and has a fibrous brown bark, which is deeply furrowed and was used by the natives for roofing their huts. Its leaves are linear and of a greenish-brown color. The wood is reddish-brown, clear and straight in the grain, and does not warp or twist. It is largely used for furniture, cabinet-work, and house-building, but is particularly valuable for bridges, wharves and marine piling, as it is durable under the ground or water, and resists the attacks of teredos for a long time. The aborigines made canoes from the trunks of these trees.

TOTEM: a word which appears to have been applied originally to the animal or other thing held sacred by certain American Indians as the sign or symbol of the tribe, or of an individual Indian. The superstition is not confined to American Indians, and has its counterpart in the symbols of civilized nations. The American eagle, the lion of Great Britain, the thistle of Scotland, the rose of England, etc., and the arms of noble families are illustrations. The practice can be traced, indeed, throughout all history, among the greatest empires and the most savage tribes.

The totem superstition varies in its features in different countries. The members of the Emu clan of an Australian tribe believe themselves to be descended from

the emu, and are regarded as forming a kind of blood-group in virtue of their common descent. No member is permitted to marry within the clan, and all the members are bound to support one another in times of necessity. No Emu clansman will knowingly kill or eat an emu. Among some savage peoples the dead totem is elaborately mourned and carefully buried. Besides clan totems there are sex totems and individual totems. The totem having an important bearing on a person's relations to his fellows, it is shown conspicuously, being often tattooed on the skin or otherwise. The importance of totemism in relation to the social and religious institutions of savage peoples was first pointed out by J. F. M'Lennan in 1868, and much fresh light has been shed on the subject by subsequent investigators, but no satisfactory explanation of this curious system has yet been advanced. Totemism exists also among many African peoples, and numerous instances of it are to be met with in Asia and Polynesia.

TOTEM POLE: a pole used among North American Indians to exhibit the totem figures. The totem pole is composed principally of three half human, half animal figures, seated above one another and holding erect a pole, on the summit of which, for instance, is the totem. See TOTEM.

T'OTHER, *tŭth'ėr:* contr. of *the other.*

TOTIDEM VERBIS, phrase, *tŏt'ĭ-dĕm vėr'bĭs* [L.]: in so many words; in the very words.

TOTIES QUOTIES, phrase, *tō'tĭ-ēz kwō'tĭ-ēz* [L.]: as often as one, so often the other.

TOTIPALMATÆ, n. plu. *tō'tĭ-păl-mā'tē* [L. *totus,* whole; *palma,* the palm of the hand]: in *zool.,* group of wading birds, of the order *Palmipedes,* having the hallux united to the other toes by a membrane in such a manner that the feet are completely webbed; cormorants, pelicans, gannets, and frigate-birds are of this group. All the totipalmatæ are marine; they feed on fishes, mollusks, and other marine animals, and are excellent swimmers and divers. Many of them have long wings and are birds of powerful flight.

TOTNES, or TOTNESS, *tŏt'nĕs:* municipal borough and market-town of Devonshire, England; pleasantly situated on the slope of a steep hill, on the right bank of the river Dart, about 10 m. from its mouth; on the South Devon railway. It is a place of great antiquity; has an interesting church of the 15th century, and some curious antique houses: the ruined keep of the ancient castle, on the summit of the hill, is said to have been built by Joel de Totneis, a Norman baron, on whom the manor was bestowed at the Conquest, and who founded here also a Cluniac priory. The river Dart is navigable for vessels of 200 tons to the town. Steamers ply during the summer months between Totnes and Dartmouth.—Pop. 4,034.

TOTO CŒLO, phrase, *tō'tō sē'lō* [L.]: by the whole width of the heaven; wide as the poles apart.

TOTONICAPAM, Guatemala: the capital of the department of the same name, situated 60 m. n.w. of the city of Guatemala. It manufactures cloth, pottery and wooden implements. Pop., consisting almost entirely of Indians, 25,000.

TOTTEN, Charles Adiel Lewis: American inventor and military instructor: b. New London, Conn., 1851, Feb. 3; d. 1908, Apr. 8. He was graduated at West Point in 1873, and has been instructor in military science and tactics at the Amherst Agricultural College, at the Cathedral School, St. Paul, N. Y., and at Yale University. He has patented improvements in high explosives, in collimating sights, and in signal-shells; besides a system of weights and measures and improvements in linear and other scales. He has patented a war game, which he described in a publication entitled *Strategos, the American War Game* (1880), and has also published *Important Questions in Metrology* (1883). Later he engaged in biblical investigations and published *Lost Israel Found in the Anglo-Saxons* (1890); *Joshua's Long Day* (1891); *The Coming Crusade* (1897); in all over 300 books and brochures.

TOTTEN, *tŏt'ĕn*, James: soldier: 1818, Sep. 11—1871, Oct. 1; b. Pittsburgh, Pa. After graduating at West Point, he served on the frontier and in Fla. He was capt. at the outbreak of the civil war, and was chief of artillery under Gen. Lyon and Gen. Fremont 1861; brig.-gen. of Mo. militia 1862; chief of artillery of the dept. of the Missouri 1864. For gallant and meritorious service at the siege of Mobile he was brevetted col. U. S. army, and later was brevetted brig.gen. U. S. army. He was retired 1870, having attained the actual rank of lieut.col.

TOT'TEN, Joseph Gilbert: soldier: 1788, Aug. 23—1864, Apr. 22; b. New Haven, Conn. He graduated at West Point 1805, and was commissioned 2d lieut. of engineers, but resigned 1806, to engage in the survey of the western territories; he returned to the engineer corps 1806. In the war of 1812 he was chief engineer under Gen. Van Rensselaer, Gen. Dearborn, and Gen. Macomb in succession, earning by his services promotion to the actual rank of capt. and brevet rank of lieut.col. He became col. and chief engineer of the army 1838. In the Mexican war he directed the siege of Vera Cruz, and was brevetted brig.gen. Thereafter his post was in Washington; but he was a member of the light-house board, and 1859-61 made a reconnaissance of the Pacific coast of the United States. In the war of secession his service was not in the field, but he was promoted brig.-gen. 1863, Mar. 3, and brevetted maj.gen. 1864, Apr. 21. He was a charter member of the National Acad. of Sciences.

TOTTER, TOTTERING, TOTTY, TOTTIE: see under TOT.

TOUCAN, n. *tō'kăn* [F. *toucan:* Sp. *tuca*]: a picarian bird of the Linnæan genus *Rhamphastos*, now forming the family *Rhamphastidæ*, of the order *Scansores*, and containing nearly 40 known species, all natives of tropical America, and remarkable for magnitude of the bill. They are divided into two groups, the true Toucans (*Rhamphastos*) and the Aracaris (q.v.) (*Pteroglossus*), of which the latter contains the greater number of species: the former has the largest bill, and the tail is shorter. There is a difference also in the prevalent colors, the aracaris generally exhibiting much green and yellow, while the true toucans have the ground color of the plumage usually black; the throat, breast, and rump often gayly adorned with white, yellow, and red. The colors, however, are not in general finely blended, but in strong contrast. The legs are short; feet have two toes before and two behind. The body is short and thick; the tail is rounded or even, varying in length in the different species from half the length to almost the whole length of the body, and is capable of being turned up over the body in a remarkable manner, which it always is when the bird is at roost. The neck is short and thick; the enormous bill is at the base of the full width and depth of the head, and is in some species more than half the length of the body. It is arched toward the tip, irregularly toothed along the margins of the mandibles, and extremely cellular and light, yet strong in structure. The tongue is very long, narrow, and singularly feathered on each side, the processes which give it this feathered appearance probably adding much to its sensibility as an organ of taste. When a T. takes food between the points of the mandibles, the tongue is immediately applied to it, as if to test or enjoy it, and afterward it is tossed into the throat by a sudden throwing back of the head. Toucans may be described as almost omnivorous; they eat fruits with avidity, and they seize and devour small birds. The powerful bill enables them to kill a small bird by a single squeeze. They make a curious clattering noise with their great mandibles, and emit at times a harsh cry. They live chiefly in small flocks in the depths of S. American forests. They are easily tamed, and endure cold climates. In captivity they readily eat rice, bread, potatoes, eggs, and many other kinds of food. They are remarkable among birds for regurgitation of food, in order to a kind of mastication in the great bill, analogous to rumination in quadrupeds. The colors of the bill are, in most of the species, very brilliant during life, but disappear from stuffed specimens in museums. The largest species, e.g., *Rhamphastos Toco*, are about 2 ft. in length. The *R. Tucanus* is the yellow-breasted T.; the *R. Ariel* is the commonest species.

TOUCH, v. *tŭch* [F. *toucher*, to touch—from OHG. *zucchen;* Ger. *zucken*, to twitch: O. Dut. *tucken*, to touch: It. *toccare;* Sp. *tocar*, to touch]: to come close to or in contact with; to perceive by physical contact; to handle, delineate, or treat slightly; to put the hand, finger, foot, or other part on or against: to play, as a musical instrument: to arrive at; to meddle with; to rub or strike against; to soften; to make an impression on, as the heart; to have an effect on: to be in a state of contact; to take effect: to treat of slightly in a discourse; to relate to; in *OE.*, to infect; to impel forcibly; to test, as gold by a stone: N. the act of touching; the state of being touched; contact of two bodies at the surface; the sense of feeling (see below): that by which anything is examined; the act of putting the hand, finger, or other part on or against: manner or style of manipulation, as in playing on an instrument; a stroke; a single stroke of a pencil upon the picture being painted: slight notice: a small quantity intermixed; a trace: feature; lineament: power of exciting the affections: in *mil.*, the contact of a man in the ranks with the man next to him, to be indicated by touching his elbow: in *OE.*, test; proof; tried qualities; a touchstone. TOUCH'ING, imp.: ADJ. affecting; moving; pathetic: N. the act of coming in contact with: PREP. relating to; with respect to. TOUCH'INGLY, ad. *-lĭ*. TOUCHED, pp. *tŭcht:* ADJ. mentally affected. TOUCHABLE, a. *tŭch'ă-bl*, that may be touched. TOUCH'Y, a. *-ĭ*, irritable: peevish; irascible. TOUCH'ILY, ad. *-lĭ*. TOUCH'INESS, n. *-nĕs*, peevishness; irritability. TOUCH AND GO, within the smallest possible point of happening; a very narrow escape. TOUCH-HOLE, the small hole of a cannon or firearm through which fire is communicated to the charge; vent (see GUN). TOUCH-NEEDLES, small bars of gold and silver, some pure, and others alloyed with certain proportions of copper, used by assayers for trying gold and silver articles. TOUCH-PAPER, paper steeped in a solution of saltpetre and dried, which burns slowly, used as a match (see NITRE). TOUCH-STONE, Lydian stone or Basanite (q.v.), a variety of flinty slate or bituminous quartz obtained from Lydia, in Asia Minor, so called from its being used to test the purity of gold and silver, the quality being judged of by the color of the streak which it leaves on the stone, as contrasted with the streak of a *touch-needle* or thin bar of metal whose purity is known—hence, a criterion. TOUCHWOOD, very dry decayed wood, used as tinder; amadou. TO TOUCH AT, to come or go to without staying; to make a call at, as steamers *touch at* certain ports. TO TOUCH ON or UPON, to treat of; to mention slightly. TO TOUCH UP, to repair; to improve by slight touches. TOUCH-ME-NOT, a plant whose ripe seed-vessel, when irritated or touched, projects the seed to some distance; the *Impatĭens nolī-me-tangĕrĕ*, ord. *Balsaminācèæ:* in *med.*, the malignant disease called lupus

TOUCH: one of the senses—that by which we take cognizance of the palpable properties of bodies. It is used in two applications. See SENSIBILITY, for touch in its general sense: the sense of touch is here dealt with in its limited application, as exercised by the organs specially adapted for the reception of tactile impressions.

The special seats of the organs of touch are the papillæ of the skin and mucous membranes (see SKIN). These are more elevated and numerous on the palmar surface of the ends of the fingers than on any other part of the skin (though they are larger on the tongue). They have an average length in man of $\frac{1}{100}$ of an inch. Their surface, after the removal of the epidermis, appears, from the investigations of Todd and Bowman, to be composed of the basement membrane of the cutis itself; and their interior is composed of fibrous tissue, vessels, and nerves (see TASTE). In each papilla is a small arterial twig, which, entering at the base, subdivides into capillary vessels, which form loops whose convexity lies in the papillary summit. The vascularity of the papillæ is so great that their presence and relative size may be determined simply by the depth of the color imparted to the skin by a good injection of its vessels. The mode in which the nerves terminate varies. They usually terminate in roundish or ovoid expansions called by various names according to their shape and structure; they are known as tactile corpuscles, Pacinian corpuscles, Krause's corpuscles, Merkel's corpuscles, etc.

In the lower animals, as in man, the papillæ are developed especially in those parts of the outer surface especially endowed with tactile sensibility. For the following illustrations of this statement, drawn from comparative anatomy, we are indebted to Dr. Carpenter: 'In the quadrumana generally, both the hands and feet are thickly set with papillæ; and in those which have a prehensile tail the surface of this organ possesses them in abundance. In the carnivorous and herbivorous mammalia, whose extremities are furnished with claws or incased in hoofs, we find the lips and the parts surrounding the nostrils to be the chief seat of tactile sensibility, and to be copiously furnished with papillæ; this is especially the case with those which have the lips or nostrils prolonged into a snout or proboscis—as in the pig, the rhinoceros, the tapir, and the elephant. In the mole, too, the papillary structure is remarkably developed at the extremity of the snout. The only part of the skin of birds on which tactile papillæ have been discovered is on the under surface of the toes and on the web of the palmipedes where they obviously receive impressions which guide the prehensile and other movements of the feet. In many lizards a papillary structure is found on the under surface of the toes, and in the chameleon it exists also on the integument of its prehensile tail. . . . In serpents and chelonians (tor-

toises) no papillary apparatus has as yet been detected; and in fishes and invertebrata its presence has not been ascertained, although it would appear that certain parts, especially the tentacles around the mouth, are endowed with a high degree of tactile sensibility.' It is probable that in all animals which have a soft fleshy tongue furnished with papillæ this organ is an instrument of tactile sensibility as well as the organ of taste. Besides the papillary apparatus, certain animals have special organs of touch, constructed on a totally different plan, and consisting of a rod or filament in itself insensible, but connected at its base with nervous fibres in such a manner that any motion or vibration communicated to it must be transmitted to them. The so-called 'whiskers' of the cats and certain rodents, as the hare and rabbit, belong to this class; and it has been proved, experimentally, that if they be cut off the animal loses, to a great extent, its power of guiding its movements in the dark.

Among the conditions necessary for exercise of the sense of touch are: (1) normal condition of the papillary apparatus and of the nerves supplying it; (2) due supply of blood to the tactile organs; (3), as noticed in the article TASTE, a temperature not too far removed from the natural heat of the body. It has been shown by Prof. Weber that if the fingers or the lips be immersed for half a minute or a minute in water heated to 125°, or cooled to 32°, the power of distinguishing between a hot or cold fluid or solid body is for the time completely lost, a feeling of pain alone being experienced. The result is the same on applying cold to the trunk of a nerve—the ulnar nerve at the elbow, where it lies just beneath the skin, being selected for the experiment. The fingers supplied by this nerve soon lost the power of distinguishing between heat and cold, and could only imperfectly perceive the contact and pressure of bodies.

There is no sense so capable of improvement as that of touch: of this power of improving the delicacy of touch, says Dr. Carpenter, 'we have examples in the case of certain artisans, whose employments require them to cultivate their tactile discrimination: thus, the female silk-throwsters of Bengal are said to be able to distinguish by the touch alone *twenty* different degrees of fineness in the unwound cocoons, which are sorted accordingly; and the Indian muslin-weaver contrives by the delicacy of his touch to make the finest cambric in a loom of such simple construction that European fingers could at best propose to make a piece of canvas at it.' The highest degree of tactile sensibility is found in blind persons—a fact due mostly to concentration of the attention and of the powers of recollection and comparison, and due probably to some extent to an increased development of the tactile organs themselves, resulting from that augmented nutrition which would be the natural consequence of the frequent use of them, and of

the increased flow of blood that seems to take place toward any part on which the attention is constantly fixed.

TOUGH, a. *tŭf* [AS. *tóh;* Low Ger. *tage;* Dut. *taai;* Ger. *zähe,* tough: Low Ger. *tögen;* Ger. *ziehen,* to pull, to draw: Gael. *tiugh,* thick, close]: admitting of bending and pulling without fracture or injury; having the property of flexibility without brittleness; flexible; not easily broken or separated; able to endure hardships; tenacious; viscous; difficult, as a *tough* piece of business; not easily masticated, as meat. TOUGH'LY, ad. *-lĭ.* TOUGH'NESS, n. *-nĕs,* the quality of a substance which renders it in some degree flexible and without much liability to fracture; tenacity; clamminess; viscosity. TOUGH'ISH, a. *-ĭsh,* rather tough. TOUGHEN, v. *tŭf'n,* to make tough; to grow tough. TOUGHENING, imp. *tŭf'nĭng.* TOUGHENED, pp. *tŭf'nd.* TOUGH'ENED or TEMPERED GLASS, glass made tough or less brittle, by being first heated, and then plunged into a hot bath of oleaginous or alkaline compounds.

TOUL, *tôl:* fortified town of France, dept. of Meurthe-et-Moselle; about 200 m. e. of Paris by railway. This fortress surrendered to the Germans 1870, Sep. 23, after bombardment of three days. It has an old cathedral, built through five centuries (965-1496), now the church of St. Etienne and in parts recently restored, and reckoned one of the most splendid in France. Cotton, woolen, lace, and faience manufactures are carried on.—Pop. about 10,000.

TOULA, or TULA, *tô'lâ:* government in Great Russia, bounded n. by the government of Moscow; 11,909 sq.m. The surface is mostly level; climate temperate; soil fertile. The Oka is its navigable river; other streams are tributaries either of the Oka or the Don. The surface is in general dry, there being no lakes or marsh-lands, and forests are rare. The inhabitants are occupied chiefly in agriculture, cattle-breeding, manufacture of pottery, fishing and working of iron mines.—Pop. about 1,600,000.

TOU'LA, or TU'LA: important manufacturing town of Great Russia, capital of the government of Toula; on the Upa, affluent of the Oka, 110 m. s. of Moscow. Its 28 churches, its arsenal, theatre, industrial museum, cathedral, and the ancient Kreml are the principal buildings. Toula is an ancient town, and has suffered severely from Tartar invasion and during the wars early in the 17th century. Iron-works founded here under Czar Alexis Michailovitch have acquired high reputation. The Russian army is supplied with muskets and small-arms largely from the works here. Cutlery, locks, tea-urns, and bells are made in great perfection; and bristles are prepared in large quantities for home consumption and export.—Pop. 111,048.

TOULMIN, *tôl'mĭn,* JOSHUA, D.D.: Unitarian minister, and author: 1740, May 11—1815, July 23; b. London. He was pastor of a dissenting congregation for a time, then of a Baptist congregation, being at the same time bookseller; later he adopted Unitarianism, and became minister of the church in Birmingham once served by Dr. Joseph Priestley. The degree D.D. was conferred by Harvard Coll. He was author of numerous works, among them *Memoirs of Socinus; Internal Evidences of Christianity; Biographical Tribute to the Memory of Dr. Priestley.*

TOULON, *tô-lōng':* great seaport and naval arsenal of France, and fortress of the first class, in the department of Var; on the shore of the Mediterranean, 42 m. e.s.e. of Marseille by railway. It stands at the head of a deeply penetrating inlet or gulf; rises in the form of an amphitheatre toward the n., where its ramparts extend to the foot of a chain of lofty elevations, in part clothed with beautiful forests. The port is divided into two parts, the old and the new—the old, on the e., appropriated to merchant-vessels, and bordered by a quay; the new, on the w., surrounded by the dock-yard, slips, arsenal, store-houses, cannon foundry, etc. Numerous forts defend the town on the land-side; and the mouth of the harbor, and the hills commanding it, are studded with forts and redoubts; while moles, hollow and bomb-proof, and formed externally into batteries, level with the water's edge, separate the roadstead from the old and new ports. Belonging to the arsenal, perhaps the finest in France, the chief objects of attraction are the sail-yard, the armory, the museum, the magazine, and the basin for repair of ships. The fortifications have been greatly extended since the conquest of Algeria, Toulon having become the chief port of communication with Africa. The population has also greatly increased, and two new suburbs have been constructed. The town is surrounded by a double rampart and by a wide and deep fosse, new defense-works having been added since 1880. The sanitary arrangements of Toulon are very defective; and cholera appeared here in a virulent form 1884. The industry and manufactures of Toulon depend mainly on the arsenal.—Pop. (1901) 101,602.

Toulon was destroyed by the Saracens 889, and again by the Saracens about the close of the 12th century. At the end of the 16th century. Toulon became important as a naval and military stronghold. It was taken by the British and Spaniards 1793; but the allies had to evacuate the town in Dec. of the same year, after being fiercely attacked by the republicans, whose guns were commanded by Napoleon—then a mere officer of artillery—who here evinced for the first time his genius and self-reliance.

TOULOUSE, *tô-lôz'* (anc. *Tolosa*): important city in s. France, cap. of the dept. of Haute-Garonne; in a

broad and pleasant plain, on the right bank of the river Garonne, 160 m. by railway s.e. of Bordeaux, 478 m. s. of Paris.—Pop. (1901) 147,696.

The *Canal du Midi* sweeps round the e. and n. sides. The Garonne is here crossed by a beautiful bridge, more than 810 ft. in length, and 72 broad, which connects Toulouse with the suburb St. Cyprien. The city, except the s. faubourg, is not particularly handsome (though the broad quays have an imposing appearance); and there are few fine public buildings. Notable, however, is the cathedral, containing the tombs of the counts of Toulouse; the *Capitole,* or town-hall; the church of St. Sernin (1090); the Musée, with its interesting collection of antiquities, forming an almost uninterrupted chain in the history of art, from the Gallo-Roman to the Renaissance period. Toulouse is the seat of an archbishop, has a university-academy, an academy of 'floral games' (*Société des Jeux Floraux*), claiming origin from the contests of the ancient troubadours, academies of arts, sciences, antiquities, etc., schools of law and medicine and artillery, a national college, an observatory, a museum, a botanic garden, and a public library of 50,000 volumes. There are manufactures of woolens, silks, leather, cannon, steam-engines, tobacco, brandy, etc., and a great trade with Spain. Its duck-liver and truffle pies are famed throughout s. France.

History.—Tolosa was, in Cæsar's time, a city within the limits of the Roman *Provincia,* and had been originally the cap. of the Volcæ Tectosages, Gallic tribe noted for wealth and consequence. Under the empire its importance continued. Ausonius describes it as surrounded by a brick wall of great circuit, and so populous that it had founded four colonies. In 412, the Visigoths made it cap. of their kingdom; and after the time of Charlemagne it was under the sway of counts, who made themselves independent about 920; but 1271 the 'county of Toulouse' was reunited to the crown of France by Philippe *le Hardi.* Its literary celebrity reaches back to the Roman empire. Ausonius speaks of the *toga docta* of 'Palladian' Tolosa; and the favorite deities of the city were Jupiter, Minerva, and Apollo. At a little village near, still bearing the name *Viel Toulouse,* a multitude of cinerary urns, statuettes. Phœnician, Celtiberian, Gallic, Greek, and Roman medals, fragments of buildings, and an entire paved street have been discovered. Early in the middle ages, under the counts of Toulouse, the city became a seat of Provençal poetry, and was the centre of the papal crusade against the Albigenses, conducted by Simon de Montfort. The parliament of Toulouse had great reputation, but unhappily is memorable most for one of its most iniquitous decisions—in the case of the Calas (q.v.) family.

TOUPEE, n. *tû-pā'* [F. *toupet,* a toupee, a dim. of OF. *toupe;* Ger. *zopf,* a tuft (see TOP 1)]: a kind of peruke; an artificial lock of hair; a curl.

TOUR, n. *tôr* [F. *tour;* It. *torno,* a turn: F. *tourner,* to turn (see TURN): comp. Gael. *turus,* a journey, a voyage]: *literally,* a going round—hence, a lengthy excursion; a ramble; a roving journey; in *OE.,* a turn or revolution; in *Milton,* for TOWER; elevation; high flight: V. to go on or make a tour. TOUR'IST, n. *ĭst,* one who performs for pleasure a lengthy journey or excursion. TOUR OF DUTY, in *mil.,* the turn to go on duty.—SYN. of 'tour, n.': jaunt; journey; pilgrimage; excursion; round; trip; ramble; circuit.

TOUR, MAURICE QUENTIN DE LA: French painter: b. Saint Quentin 1704, Sept. 5; d. there 1788, Feb. 18. He began his art studies in his native town and subsequently devoted himself to the execution of pastel portraits in Paris, in which city he gained such reputation that the most famous of his contemporaries gave sittings to him. In 1746 he was elected to the Académie. He returned to his native town in 1784 and the Saint Quentin Museum now contains 80 portrait pastels of his. His *Pompadour* is in the Louvre; and there are two other of his pictures in the Dresden Gallery.

TOU'RACO: a large and beautiful African bird of the genus *Corythaix;* with a short, rather small, high bill; both mandibles notched and finely serrated; short, rounded wings, with the three first quills graduated; a long rounded tail, short, strong feet and an erectile crest. Their prevailing color is green, with purple on the wings and the tail, the peculiar red of which is furnished by a special pigment called turacin. They feed on fruits, perch on the highest branches of trees. It is a member of the family of plantain-eaters.

TOURAINE: a former province and duchy of France, bounded by Maine, Orleannais, Berry, Poitou and Anjou. Its capital was Tours. It now forms the department of Indre-et-Loire. It was anciently inhabited by the Gallic tribe of Turones.

TOURBILLION, n. *tôr-bĭl'yŭn* [F. *tourbillon,* a whirlwind—from L. *turbo, turbinus,* a whirlwind, a whirlpool]: a fire-work so arranged as to rotate in the air, giving the appearance of a scroll of fire.

TOURCOING, *tôr-kwâng':* frontier-town of France, department of Nord; 7 m. n.e. of Lille; on an eminence in a fertile district. It is a well-built and prosperous manufacturing town with modern churches and schools, also a handsome hôtel-de-ville in Renaissance style. It has improved commercially, and the staple manufactures are the textiles of all kinds; besides dye-works, soap-works and sugar refineries. The manufacture of velvet carpets has extended especially. The chief imports are wool, flax, yarn and hemp. Exports combed wool, yarn, tissues, rags and flax. It is becoming one with the adjoining town Roubaix. Pop. (1901) 79,243.

TOURELLE, n. *tô-rĕl'* [F. dim. of *tour*, a tower]: small tower attached to a castle or mansion, and usually containing a winding stair.

TOURGEE, Albion Winegar: American jurist and author: b. Williamsfield, Ashtabula co., Ohio, 1838, May 2; d. Bordeaux, France, 1905, May 21. He was graduated at the University of Rochester (N. Y.), enlisted May 1861 as a private in the 27th New York volunteers, was wounded at the first battle of Bull Run, and having been discharged, studied law and was admitted to the bar at Painesville, Ohio. In 1862 he re-entered the military service as 1st lieutenant in the 105th Ohio, in 1864 resigned, and in 1865 began professional practice at Greensboro, N. C. He was a delegate to the Southern Loyalist convention at Philadelphia in 1866, and in 1867 to the constitutional convention of North Carolina, where he drafted the article on the judiciary. From 1868 to 1874 he was judge of the superior court of the state. During his term of office the Klu-Klux Klan was exposed and largely broken up, and his services to this end were very efficient. The sworn statements of several hundred members received by him were later utilized in a series of fictional works dealing with Reconstruction times in the s., of which *A Fool's Errand* (1879) was the best known. Contemporary interests in these books was great, and their sales were very large for those days. Tourgee was made consul at Bordeaux in 1897, consul-general at Halifax in 1903, and from then until his death was again consul at Bordeaux. He was editor of *The Continent* (1882-4; 5 vols.), an illustrated weekly published in New York (Vol. III in Philadelphia). Among his other works were: *Bricks without Straw* (1880); *John Eax* (1882); *An Appeal to Cæsar* (1884); *Button's Inn* (1887); *With Gauge and Swallow* (1889); *Murvale Eastman* (1890); *Out of the Sunset Sea* (1892); and *The Mortgage on the Hiproof House* (1896).

TOURGOUENIEFF, Ivan Serjevich. See Turgenef.

TOURJEE, Eben: American musical conductor: b. Warwick, R. I., 1834, June 14; d. Boston, Mass., 1891, Apr. 12. He studied at the academy at East Greenwich, R. I., and later opened a small music store in Fall River, Mass. Later he turned to music-teaching, both privately and in the public schools. After a period of study in Europe he opened a conservatory at Providence in 1864. This institution was removed to Boston in 1867 and became the New England Conservatory of Music, which has grown to be the most important music institution of the kind in America. In 1872, when the College of Music of Boston University was founded, he became its dean. He was the organizer of several large choruses, notably that assembled for the Peace Jubilee in 1869, and another of nearly 20,000 singers for the World's Peace Jubilee in 1874.

TOURMALINE, n. *tôr'mă-lĭn* [from *tournamal*, its name in Ceylon]: aluminous mineral occurring in primitive rocks in many parts of the world, in long prismatic crystals, most frequently black, but found of various colors, and ranked among Gems (q.v.); schorl. Its chemical composition is very complex and somewhat various, but the chief constituents are always silica and alumina in about equal proportions, and forming about three-fourths of the whole; the remainder consisting of boracic acid, fluorine, phosphoric acid, peroxide of iron, peroxide of manganese, protoxide of iron, magnesia, lime, soda, potash, and lithia —not, however, all present in any specimen. T. is harder than quartz, but not so hard as topaz or emerald. Its specific gravity is a little more than 3. It occurs in crystals, or massive and dispersed, though always crystalline. Its lustre is vitreous. Some varieties are transparent, some translucent, some opaque. Some are colorless, some green, brown, red, blue, and black. Red T. is known as *Rubellite;* Blue T. as *Indicollite;* Black T. as *Schorl:* the black is the most common. T. crystallizes in prisms, with 3, 4, or 9 sides, variously acuminated. The sides of the prisms are striated. The finest tourmalines are much valued by jewellers, but are comparatively rare. They mostly come from Ceylon, Siberia, and Brazil. Tourmaline of gem value has been found at Paris, Maine.

TOURNAMENT, n. *tôr'nă-mĕnt* [OF. *tornoiement*, a tournament—from *tournoier*, to joust: *torner*, to turn (see TURN): It. *torneamento*, a tournament; *torneare*, to surround, to tilt]: a mock fight by knights on horseback; a martial sport of the middle ages for exhibiting prowess and skill in arms; in *OE.*, encounter: shock of battle: in modern usage, any contest of skill in which a number of persons take part, e.g., a chess *tournament.* TOUR'NEY, v. *-nĭ*, to perform at tournaments: to tilt in the lists: N. a tournament. TOUR'NEYING, imp. TOUR'NEYED, pp. *-nĭd.*

TOUR'NAMENT: military sport of the middle ages, in which combatants engaged one another with the object of exhibiting their courage, prowess, and skill in the use of arms. The invention of the T. has been ascribed by some writers to Geoffroy de Prenilly (10th c.), ancestor of the Counts of Anjou. France was its earliest scene, whence it spread first to Germany, then to England early in the 12th c., afterward to s. Europe. A T. was held usually on invitation of some prince, who sent a king-of-arms or herald through his own dominions and to foreign courts, signifying his intention of holding a T. and a clashing of swords in presence of ladies and damsels. The intending combatants hung up their armorial shields on the trees, tents, and pavilions round the arena, for inspection, to show that they were worthy candidates for the honor of contending in the lists, in respect of noble birth, military prowess, and unspotted character. The combat took place on horseback, at least was always begun on horseback, though the combatants who had been dismounted frequently continued it on foot. The usual arms were blunted lances or swords; but the ordinary arms of

warfare, called arms *à l'outrance*, were used sometimes by cavaliers solicitous of special distinction. Tournaments were under minute regulations, which in some degree diminished their danger. The prize was bestowed by the lady of the T. on the knight to whom it had been adjudged, he reverently approaching her, and saluting her and her two attendants. The period when tournaments were most in vogue comprised the 12th, 13th, and 14th c.; and the place where the most celebrated English tournaments were held was the tilt-yard near St. James's, Smithfield, London. The church at first discountenanced tournaments, some of its decrees prohibiting persons from engaging in them under pain of excommunication, and denying Christian burial to a combatant who lost his life in one; but the church seems to have looked with more favor on these combats after the middle of the 13th c. During the 15th and 16th c. tournaments continued, but the change in the social life and warfare of Europe had changed their character, and they became state pageants rather than real combats. The death of Henry II. of France, 1559, consequent on the loss of his eye at a T., led to their general abandonment in France and elsewhere, and there have been few attempts to revive them even as mere spectacles. A magnificent entertainment consisting of a representation of the old T. was given at Eglinton Castle, England, 1839, by the Earl of Eglinton: Lady Seymour was the Queen of Beauty, and many of the visitors enacted the part of ancient knights; among them Prince Louis Bonaparte, afterward Napoleon III.—According to Ducange, the difference between a T. and a JOUST, is that the joust is a single combat, while in the T. a troop of combatants encounter one another on either side; but this distinction has not been always observed.

Armor for Tournament, 1490.

TOURNAY, *tôr-nā'* (Flemish, *Doornik*): fortified town of Belgium, province of Hainault; on both sides of the Scheldt, near the French frontier. It has a splendid cathedral with five towers (and pictures by Jordaens, Rubens, Gallait, etc.), several fine churches, particularly St. Quentin and St. Jacques, a gallery of art, an episcopal seminary, five hospitals, and a lunatic asylum. Although one of the oldest towns in Belgium, T. has a modern appearance, with fine suburbs and beautiful broad streets. The chief manufactures are hosiery, linen, carpets, and porcelain; but there are few large work-shops, most of the fabrics being executed by the people in their own houses. A little to

the s. e. is the famous village of Fontenoy (q.v.).—Pop. of T. (1880) 32,566; (1891) 35,403; (1901) 35,327.

T., anc. *Tornacum* or *Turris Nerviorum* ('Fort of the Nervii'), was in the 5th and beginning of the 6th c. the seat of the Merovingian kings. It subsequently belonged to France, but at the peace of Madrid was included in the Spanish Netherlands. Afterward it was more than once taken by France, but again restored by treaty. 1794, May, it was the scene of several hotly contested fights between the French and Austro-English armies, the most important of which was that of May 19, in which Pichegru defeated the Duke of York.

TOURNEFORT, *tôr-nĕh-for'*, JOSEPH PITTON DE: botanist: 1656–1708, Dec. 28; b. Aix, in Provence. From youth, through his whole life, he was an ardent botanist. He became prof. of botany at the Jardin des Plantes 1683; and was sent, at the king's expense, to Spain, Portugal, England, and Holland, and to the East. He added a great number of species to the list of known plants. He died in Paris. He published several botanical works—the chief being *Institutiones Rei Herbariæ* (3 vols. Paris 1700). His botanical system maintained its ground till the time of Linnæus; and was of great service by its grouping of plants in genera. Previous botanists had described them individually, as species.

Common Tourniquet.

TOURNIQUET, n. *tôr'nĭ-kĕt* [F. *tourniquet*, a turnstile, tourniquet—from *tourner*, to turn]: in *surgery*, instrument for compressing the main artery of the thigh or arm, either to prevent too great loss of blood in amputation, or to check dangerous hemorrhage from accidental wounds, or to stop the circulation through an aneurism.

The common tourniquet consists of three parts—(1) a pad to compress the artery; (2) a strong band, buckled round the limb; (3) a bridge-like contrivance over which the band passes, with a screw whose action raises the bridge and consequently tightens the band. The best kind of pad is a small firm roller about an inch thick; it must be placed lengthways over the main artery so as to compress it against the bone, and must be secured in its place by a turn of bandage, over which the band of the tourniquet must be applied. This band must first be tightly buckled, and the pressure must be then increased to the necessary extent (namely, till the beating of the artery beyond the instrument ceases to be perceptible) by the action of the screw, which should always be opposite the buckle of the band. As the instrument arrests the venous blood, it should never be applied tightly in cases of amputation until the surgeon is ready to make his incision, as otherwise there would be excessive loss of venous blood.

The invention of the tourniquet is ascribed usually to the French surgeon Morel, who, 1674, used a stick passed beneath a fillet and turned round so as to twist it up to the requisite degree of tightness for preventing flow of blood—a rude form of tourniquet which may be extemporized in emergency.

TOURO, *tô'rō*, JUDAH: American philanthropist: b. Newport, R. I., 1775, June 16; d. New Orleans, La., 1854, Jan. 18. He was the son of Rev. Isaac Touro, who in 1762 was chosen rabbi of the Jewish congregation of Newport, R. I. The son removed to Boston, Mass., where he engaged in business with his uncle, Moses Hays, in whose employ he sailed to the Mediterranean in 1798 as supercargo. In 1802 he settled in New Orleans, where he became a wealthy merchant. He displayed his patriotism in the war of 1812 by enlisting as a volunteer in Gen. Jackson's army, and was severely wounded at the battle of New Orleans. The range of his benevolence was very broad; families and individuals, churches and synagogues alike were enriched by him. Toward the erection of the Bunker Hill Monument he gave $10,000.

TOURS, BERTHOLD: Dutch composer: b. Rotterdam, Holland, 1838, Dec. 18; d. London 1897, Mar. 11. He studied at Leipsic and Brussels and going to London in 1861 became musical editor to Novello, Ewer & Co., 1878. His productions were principally religious in character and his *Service in F, Blessing, Glory, Wisdom, and Thanks,* and *O Saving Victim* were especially favorites. As a church composer he represented, with Stainer and Barnby, a new phase of English church music which comprehends the introduction of new dramatic and melodic elements for which the entire school is probably indebted to M. Gounod.

TOURS, France: capital of the department of Indre-et-Loire, on the left bank of the Loire, at the confluence

of the Cher, 120 m. s.s.w. of Paris. The principal entrance to the city is by a magnificent bridge across the Loire, 1,423 ft. long. The banks of the river are enclosed by a quay, lined with handsome houses and finely-planted promenades. Great part of the town is new, and many of the streets are spacious and elegant; but the older quarters are inferior. The principal edifice is the cathedral. Its w. front consists of three lofty flamboyant portals surmounted by a window of astonishing dimensions, and flanked by two domed towers, 205 ft. high. The interior, of the purest Gothic, and lighted by beautifully stained glass, is 256 ft. in length and 85 ft. in height. Two towers form conspicuous objects from every part of the town; one called the tower of St. Martin or Horloge, from containing the principal clock; the other the tower of Charlemagne, because his queen Luitgarde was buried below it; and both remarkable as the only relics which the revolutions of 1793 have left of the vast cathedral of St. Martin of Tours, after it had flourished for 12 centuries. The archiepiscopal palace is regarded as one of the most handsome in the kingdom. The manufactures consist of silk stuffs, ribbons, broadcloth, serge, rugs, chemicals, and leather; and the trade is in corn, wine, brandy, dried fruits, wax, hemp, wool, etc. Tours early acquired considerable importance, and under the Romans was known by the name of Cæsarodunum. It was from the gates of Tours that Charles Martel (q.v.) drove back the Moslem invasion of Europe in 732. In modern times it became famous for its silk manufactures, and had so extended as to have a population of 80,000, when the revocation of the Edict of Nantes deprived it of nearly half its inhabitants, and almost all its industry, and inflicted a blow on its prosperity from which it has never recovered. During the Franco-German war Tours was made the seat of the government delegation during the siege of Paris 1870, Sept. 12. The delegation removed to Bordeaux on Dec. 10. Tours surrendered to the Germans on Dec. 21. Pop. (1901) 64,448.

TOURVILLE, Anne Hilarion de Cotentin, Count de: French naval officer: b. Tourville, department of La Manche, 1642, Nov. 24; d. Paris 1701, May 28. He entered the navy in 1660, became a captain in 1667, participated in the battle of Agosta in 1676, and in command of the vanguard at the battle of Palermo in 1677 he destroyed 12 of the enemy's ships. He was appointed lieutenant-general of marine in 1680, commanded several expeditions against the N. African pirates in 1682-8, became vice-admiral in 1689, and in 1690 was in command of the fleet which supported James II of England. He defeated a Dutch-English fleet off the Isle of Wight in that year, but in 1692 was ordered to attack a superior fleet off Cape La Hogue, in order to facilitate the landing of the Jacobites, and was defeated. He was

created marshal of France in 1693, and in that year he captured and destroyed a Dutch-English fleet off Cape Saint Vincent. At the outbreak of the war of the Spanish succession he was appointed commander-in-chief of the combined naval forces of France and Spain.

TOUSE, v. *towz*, or TOUSLE, v. *towz'l* [Low Ger. *tuseln*, Ger. *zausen*, to pull the hair about: AS. *tæsan;* O.Dut. *teesen;* Dan. *tæse*, to tease wool—*lit.*, to pull to pieces]: to card or dress wool by pulling it to pieces, which are laid together again a number of times; to pull about; to drag; to tumble; to rumple; to dishevel. TOUS'ING, imp. TOUSED, pp. *towzd*. TOUS'ER, n. *-ėr*, one who touses.

TOUSSAINT' LOUVERTURE, *lô-vĕr-tür'*, PIERRE-DOMINIQUE (original name, BREDA): 1746, May 20—1803, Apr. 27; b. Breda, San Domingo: one of the liberators of Hayti (q.v.). His father and mother were both African slaves—his father claiming descent from an African chief. When the French Revolution broke out, it found Toussaint Louverture in the position of coachman, and a sort of sub-manager of an estate. He early showed unusual abilities, and obtained a good education—acquiring also some knowledge of surgery and medicine. In 1791 the French convention passed the memorable decree by which the rights of French citizens were given to people of color. In the revolutionary strife which followed in San Domingo Toussaint was, for the next three years, conspicuous for his adherence to the cause of royalty and Rom. Catholicism; but the decree of 1794, Feb. 4, declaring all slaves free, won him to the side of the French republic. He joined their commander, Laveaux, by whom he was made a general of division. In 1793, in the midst of the troubles, the British landed a force and took partial possession of the island. Against them Toussaint Louverture proved himself an able and indefatigable enemy, bringing the whole n. division of the island under the dominion of the French republic. As a military commander he showed decided genius: his name Louverture was given him because of his prowess in *opening* gaps in the ranks of the enemy. In 1795, in consequence of a conspiracy of three mulatto generals, Laveaux was arrested at Cape Town; but Toussaint, assembling his negroes and joining the French force, quickly effected the release of the governor. The gratitude of Laveaux was very great; and 1796 the commissioners of the directory appointed Toussaint chief of the army of San Domingo. Shortly afterward Gen. Maitland, Brit. commander, surrendered to Toussaint Louverture all the strong places which he had hitherto held in the island. This was followed 1801 by the submission of the Spanish forts. The whole of San Domingo was then under the rule of Toussaint Louverture. His sway was vigorous and upright; and the agriculture and trade of the island flourished under him. But a more powerful ruler

now found himself at leisure to interfere in the affairs of Hayti. During the peace of Amiens, Napoleon Bonaparte issued a proclamation re-establishing slavery in San Domingo. This was met by a counter-proclamation by T. L., issued 1801, Dec. 18, in which, while professing obedience, he showed plainly that he meant resistance. A squadron of 54 sail of the line, under Gen. Le Clerc, soon made its appearance to enforce the edict of the first consul. T. was compelled to retire, was proclaimed an outlaw, and, agreeing to surrender, was received with military honors. He was afterward treacherously arrested, and sent to Paris, and after ten months' rigorous imprisonment, died in the prison of Joux, near Besançon.—See *Vie de Toussaint l'Ouverture*, by St. Remy (Par. 1850); *The Life of T.*, by Dr. Beard (Lond. 1853); Charles Sumner's *Toussaint Louverture*.

TOUT, v. *towt* [Icel. *tota*, a snout; *túta*, anything sticking out: Sw. *tut*, a point, a muzzle]: to look: to peep; to look out for custom: N. one who watches race-horses in the course of training to secure information for betting; a touter. TOUT'ING, imp.: N. the act or practice of looking out for customers by means of paid agents. TOUT'ED, pp. TOUT'ER, n. *-ėr*, one who hangs about places frequented by tourists, to offer his services, or to secure their custom for a particular inn, conveyance, etc.

TOUT ENSEMBLE, n. *tôt âng-sâng'bl* [F., all together]: the whole of anything taken together; anything regarded as a whole without regard to distinction of parts; specifically, in the fine arts, the general effect of a work of art without regard to execution of details.

TOW, n. *tō* [Fris. *touw*, tow: Icel. *tog*, the long hairs or coarse shaggy part of the fleece; *tó*, a tuft of wool for spinning (see also Tow 2)]: the coarser part of flax or hemp separated from the finer part by the hackle or swingle.

TOW, v. *tō* [F. *touer*, to tow a vessel by a rope: Dut. *toghen;* Icel. *toga*, to pull, to drag: Icel. *tog;* Dan. *toug*, a cable: AS. *teon*, to draw]: to drag, as a boat or ship, through the water by means of a rope. TOW'ING, imp.: N. the act of drawing through water by means of a rope. TOWED, pp. *tōd*. TOWING-BOAT, a boat that tows; a tug-boat. TOW-LINE, or TOW-ROPE, a rope or cable used in towing or dragging a vessel through the water. TOW-PATH, or TOWING-PATH, the roadway on the banks of a canal for men or horses that tow. TOWAGE, n. *tō'āj*, the act of towing; the price paid for towing.

TOWANDA, *to-wân'da:* borough, cap. of Bradford co., Penn.; on the Susquehanna river, and on the Barclay, the Lehigh Valley, and the State Line railroads; 37 m. s.s.e. of Elmira, 85 m. w.n.w. of Scranton. It is in an agricultural and stock-raising region. It contains several churches, a high school and graded public schools, courthouse, a high school library and a college library, Susquehanna Collegiate Institute, 2 banks, and daily, weekly and monthly periodicals. The industries comprise planing, saw, and flour mills, nail, furniture, toy, and piano and organ factories, brewery and agricultural-implement works.—Pop. (1890) 4,165; (1900) 4,663.

TOWARD, prep. *tō'ĕrd*, or To'WARDS, *-ĕrdz* [AS. *to-weardes*—from *to*, to and *weard*, direction]: in the direction of; with a tendency to; with respect to; regarding: AD. nearly; near at hand. To'WARD, a. ready to do or learn; docile; in *OE.*, rash; bold. To'WARDLY, ad. *-lĭ*. To'WARDNESS, n. *-nĕs*, or To'WARDLINESS, n. *-lĭ-nĕs*, readiness to do or learn; docility; aptness.

TOWEL, n. *tow'ĕl* [F. *touaille;* OHG. *twahilla*, a towel. It. *tovaglia*, a table-cloth: Goth. *thwahan;* AS. *thwean*, to wash]: a cloth for wiping the face, hands, or person, especially after washing; a cloth used for wiping dishes or the like after being washed; an altar-cloth. TOW'ELLING, n. cloth for towels.

TOW'EL GOURD, or LOOFAH, *lôf'ah* (*Luffa ægyptiaca*): species of cucurbitaceous plant, cultivated in Egypt, Arabia, India, China, etc., and in the s. United States. It is a climbing vine, remarkable chiefly for its ovate, fleshy fruit, somewhat like a cucumber, which varies from 6 in. to 2 ft. in length. The close vascular network of the interior of the fruit, when freed from interstitial matter and seeds, constitutes the *loofah* or T. G. of commerce. It has long been used for scrubbing-brushes, flesh-brushes, and strainers. From the fibre are made in-soles for shoes, saddle under-cloths, surgical bandage stuffs, etc.

TOWER. n. *tow'r* [W. *tŵr*, a tower, a heap or pile: F. *tour;* L. *turris*, a tower: Gael. *tùr*, a tower]: a lofty building, of any form in plan, consisting of many stories, or high in proportion to its lateral dimensions; a part of a building rising high above the main edifice; a movable wooden edifice mounted on wheels, used in ancient warfare to attack a besieged town or fortress; in *OE.*, high flight; elevation: V. to be lofty; to rise above; to rise and fly high; to soar. TOW'ERING, imp.: ADJ. very high; elevated; soaring. TOWERED, pp. *tow'rd:* ADJ. having towers; adorned or defended by towers. TOWERY, a. *tow'r'ĭ*, adorned or guarded with towers; lofty. TOWER-MUSTARD, n. *tow'r-mŭs'tĕrd*, a hardy annual plant whose foliage is so disposed on the stem as to give it a pyramidal appearance; the *Arăbĭs turrīta*, ord. *Cruciferæ*.

TOW'ER: town in St. Louis co., Minn.; on Vermilion Lake, and on the Duluth and Iron Range railroad; 96 m. n. of Duluth. It is in an exceptionally rich iron and timber region; was incorporated 1884, and has all the advantages of a successful, thriving town. One of its mines is said to be the largest, and to produce the most ore containing the highest per cent. of metallic iron, of any mine in the world; and a few m. n. of the town is an invaluable tract of the best quality of Norway and white pine.—T. has 5 churches, 2 graded schools, 1 weekly newspaper, and several important manufacturing establishments.—Pop. 1,500.

TOWER, *tow'ėr*, Zealous Bates; soldier; b. Cohasset, Mass., 1819, Jan. 12. He graduated at West Point 1841, first in a class of 52, and was commissioned 2d lieut. of engineers and assistant professor of engineering at the Military Academy. He served with distinction through the Mexican war; superintended important military and public works 1848-61; became maj. of engineers 1861, Aug. 6, and was chief engineer in the defense of Ft. Pickens. As brigadier general of volunteers he served in n. Virginia under Banks and Pope, and was severely wounded at the second Bull Run battle, 1862, Aug. 30; returning to duty in the field 1864, Sep., he served in the milit. divisions of the Mississippi and Tennessee till the end of the war. He was retired as colonel 1874, and brevet major general.

TOW'ER HAM'LETS: English parliamentary borough in Middlesex, in the e. of London, and having the City and Finsbury w. of it. Till 1885 it sent two members to parliament; since then it falls into seven electoral districts, each returning one member. The divisions are those of Whitechapel, St. George's-in-the-East, Limehouse, Mile-End, Stepney, Bow and Bromley, and Poplar. In Tower Hamlets are the Tower of London, Mint, Trinity House, and many of the principal docks.—Pop. of borough (1891) 444,000.

TOWER OF LONDON: in feudal days, a powerful fortress; then, and long afterward, a state prison of gloomy memories; now a government store-house and armory, and still, in some sense, a stronghold; an irregular quadrilateral collection of buildings on rising ground adjoing the Thames, and immediately e. of the City of London. The space occupied is between 12 and 13 acres, and the whole is surrounded by a moat of no great depth. Usually the moat is dry, but the garrison have the power of flooding it. Seen from without, the moat is bordered within by a lofty castellated wall, broken by massive flanking-towers at frequent intervals. Within this wall rises a second wall of similar construction but greater height; and within this are the several barracks, armories, etc.; and in the centre of all, the lofty keep or donjon known as the White Tower. This last, which nearly resembles Rochester Castle, and, like it, was built by Gundulph, Bp. of Rochester, in the time of William the Conqueror, is the centre of interest and antiquity in the whole structure. Its walls are in parts 16 ft. thick, of solid masonry. This tower was the court of the Plantagenet kings. The various other towers are noteworthy principally for the illustrious prisoners who have pined in them, or left them for the scaffold. In the n.w. corner of the quadrangle is St. Peter's Chapel, now the garrison church. In another part is the Jewel-house, containing the crown jewels, or *Regalia*, comprising several crowns, sceptres, globes, and jewels of enor-

mous value. Near this building is the Horse-armory, a collection of ancient and mediæval arms and armor, the latter being exhibited in complete suits on wooden figures of men and horses. To the crown jewels and the armory, visitors are admitted on payment of a small fee.

Early writers alleged that Julius Cæsar built the Tower of London as a Roman fortress; but there is no record to prove the existence of any fortress on this site before the construction of the White Tower by Bp. Gundulph 1078. Some earlier structure of the Saxon times appears to have been there, from the massive foundations discovered in the course of subsequent erections; but of the nature of these buildings nothing is known. During the reigns of the first two Norman kings, the Tower seems to have been used as a fortress merely. In Henry I.'s time it was already a state prison. That monarch and his successors gradually increased the size and strength of the ramparts and towers, until the whole became a stronghold of the first class for feudal times. The kings frequently resided there, holding their courts, and sometimes sustaining sieges and blockades from their rebellious subjects. Of the long list of executions of prisoners confined here for political offenses, real or imputed, that of Lords Kilmarnock, Balmerino, and Lovat, after the rebellion of 1745, was the last. Wilkes, Horne-Tooke, and others have since been confined there; but, happily, blood has ceased to flow since the existence of a living political opposition has been found consistent with the safety of the government.

Not the least interesting memorials are the quaint and touching inscriptions cut by hapless prisoners on the walls of their dungeons.

In 1841 a serious fire broke out in the Bowyer Tower, and extended to the armories, causing the destruction of numerous modern buildings and many thousand stand of arms. At present the Tower of London is a great military store-house in charge of the war dept., containing arms and accoutrements for complete equipment of a large army. The mint and public records, formerly kept in it, have been removed to other buildings more suitable. Flamsteed, when first appointed astronomer-royal, made his observations from the summit of the White Tower; afterward he removed to Greenwich. As a fortress, the Tower would be useless against modern arms.

The government is vested in a constable, who has great privileges, and is usually a milit. officer of long service and distinguished mark; the deputy-constable, also a gen. officer of repute, is the actual governor. He has a small staff under him, and the corps of yoemen of the guard, jocularly known as Beef-eaters (see BEEF-EATER). In addition, a wing, and occasionally a battalion, of infantry is quartered in the barracks.—Bayley's *History of the Tower of London*, 2 vols. 4to; *Memoirs of the Tower*, by Britton and Brayley (1831); *Memorials of the Tower*

of London, by Lord De Ros (1866); *Her Majesty's Tower,* by Hepworth Dixon, 4 vols. (1871).

TOWER, Round: a building peculiar to early Christian architecture, of slender form, and usually bearing a conical roof. Windows are few in number and generally small. The type is common to Ireland, and in addition to the Irish bee-hive huts forms its only distinctive contribution to architecture. More than one hundred exist in Ireland. A few examples are to be found in Great Britain and on the Continent, pointing to the time of the invasion of the Irish missionaries. The smallness of the windows seems to make it improbable that the towers were used for bells and rather points to their employment for defensive purposes. The name is given to remains of structures of American Indians of the Pueblo type. They are found standing in isolation or in connection with walls of rectangular form. Some are interesting structurally for their two or three concentric walls, with the two outer ones connected by transverse walls on radial lines. They were built of roughly dressed stone and when found adjoining other structures are known as kivas.

TOWER OF SILENCE: name applied to structures built by the Parsees for the disposal of their dead. They are towers—called *dakhmas*—about 40 ft. high, and with large diameter. Somewhat below the top of the wall is built a floor of iron grating and upon this the bodies of the dead are placed until by exposure to the elements and to birds of prey the flesh is entirely removed from the bones, and they have fallen into a pit below. From here the bones are removed to neighboring caverns. One of these 'towers of silence' stands in the neighborhood of Bombay, India.

TOWER OF THE WINDS. See Athens.

TOW'HEE BUNTING: a large, black, white and chestnut bunting of the American genus *Pipilo,* several species of which occur in the United States. Several are confined to the southwest, but one species, the chewink, or ground-robin (*P. erythropthalmus*) is numerous in summer throughout the whole of the eastern half of the country, and its sharp, metallic call is familiar to every countryman. In spring the male has a delightful song, but one not frequently heard. The nest of the towhee is made upon the ground in the woods, where the birds spend most of their time, scratching vigorously among the leaves for their food; and its five red-spotted eggs are cleverly concealed by a domed canopy of twigs and leaves.

TO WIT, ad. *tû wĭt'* [*to,* and *wit*]: namely; that is to say.

TOWLE, *tōl,* George Makepeace: author: b. Washington, D. C., 1841, Aug. 27; d. 1893, Aug. 8. He graduated at Yale 1861, and in law at Harvard 1863; prac-

ticed law in Boston till 1865; was U. S. consul at Nantes, France, 1866-68, and then in Bradford, England, till 1870. He was an editorial writer for the Boston *Commercial Advertiser* 1870-71, and for the Boston *Post* 1871-76. He was a frequent contributor of essays (largely biographical and historical) to magazines, and is author of a great number of books; among them: *American Society* (London 1870); *Modern Greece;* 6 vols. of *Young Folks' Heroes of History; Modern France; Young People's History of England; of Ireland.*

TOWN, n. *town* [Low Ger. *tuun,* an inclosed place: Icel. *tún,* an inclosure: Gael. *tuin,* a dwelling: Scot. *toon,* a hamlet, a farm-house: Ger. *zaun,* a hedge: AS. *tynan,* to inclose]: originally, an inclosed place, or a place hedged in, then a farm, dwelling, village, or collection of houses walled in; any collection of houses larger than a village, generally a borough or city; any principal collection of houses of a county; the people of a town or city. TOWN'LESS, a. *-lĕs,* without towns. TOWN-ADJUTANT, TOWN-MAJOR, milit. officers on the staff of a garrison, usually veterans—the adjutant ranking as capt., the major as lieut. TOWN-CLERK, the clerk to a town or to a municipal corporation, elected in the United Kingdom by the town-council, and in the United States by the towns-people. TOWN-COUNCIL, body of representatives elected by their fellow citizens to manage the municipal affairs. TOWN-CRIER, person employed by a town to make announcements of sales, intended meetings, etc. TOWN-HALL, building where the public business of a town is transacted. TOWN-HOUSE, residence in a town, as distinguished from a *country-house.* TOWNSHIP, n. the territory or district of a town; a subdivision of a county: in *Eng. law,* a division of a parish in which there is a separate constable, and for which there may be separate overseers of the poor (see MUNICIPALITY). TOWNSFOLK, n. *townz'fōk,* the people of a town or city. TOWNS'MAN, n. an inhabitant of the same town. TOWN-TALK, the subject of common conversation.—*Town,* in the United States, is sometimes used, as in New England, in the sense of *township,* a subdivision of a county. In other states it is a municipal corporation of a kind inferior to a city in organization and powers, extending over a definite portion of a township (see MUNICIPALITY).

TOWN AND TOWN MEETINGS: in its broadest meaning the word town denotes simply a collection of houses without regard to the size of the collection and without regard to the form of its political organization. In this sense a hamlet without any governmental powers at all of its own may be referred to as a town and likewise a great municipality like New York or London may be thus designated. In some of the southern and western states 'town' is the legal designation of a municipal

corporation whose powers are greater than those of a village and smaller than those of a city. In the New England states, while the word town is often used in a loose or broad sense, more frequently a town denotes a minor civil division which is sometimes wholly rural, sometimes wholly urban, and sometimes partly rural and partly urban. A primary meeting of the voters of a New England town summoned for the consideration of local business is called a town meeting.

The Pilgrim Fathers who settled at Plymouth (1620) and the Puritans who settled (1628-30) at Salem and Boston began at once to develop a system of local government. They settled in compact communities and gave the name town to the thickly inhabited portion of a grant or purchase. The uninhabited land lying outside of the town, yet belonging to the grant, was at first called the township, but in time, as building was extended, the word town came to be used to denote the whole extent of the town's domain. The organization of the town was accomplished through the agency of a town meeting. The early settlers of New England were equals in social rank; their average of intelligence was high; they were nearly equal in worldly possessions. Respecting matters of government, they were intensely democratic and at the same time intensely theocratic. They believed that the state should be a 'city of God' and that authority in spiritual and temporal matters should flow from a common source. Accordingly their town meetings were religious assemblages acting as pure democracies, except in Rhode Island, where the civil authority did not interfere in matters of conscience.

In its essential characteristics town government in New England has not changed greatly since the days of the early settlers, except in its religious feature; that feature entirely disappeared in the early part of the 19th century, when the separation of church and state was achieved. Details in the organization and in the powers of the town differ in the different New England states, yet the outlines of town government in all these states are practically identical, and are as follows: The state legislature defines the boundaries of the town, incorporates it, and confers powers upon it. As a corporation, the town can sue and be sued, and can acquire and hold real property. A town may be divided by the legislature into two or more towns or can be united with and made a part of another town. The public affairs of the town are transacted in a town meeting which meets annually, and also assembles in special meetings which may be called from time to time. The meeting is held in the town hall or in some other hall sufficiently large to accommodate the mass of voters. When the people have assembled, the town clerk calls them to order and states the purposes for which the meeting is called. A moderator (presiding officer) is then chosen and business proceeds according to parliamentary rules. All ques-

tions are decided by a majority vote of the legally qualified voters in attendance. Usually citizens who are qualified to vote for a governor and for members of the state legislature are also qualified to vote in town meeting. Here is democracy in its purest form. Young and old, rich and poor, the obscure and the prominent, are present, and every citizen may not only vote, but, if he chooses to do so, may also bring the full force of his character and influence to bear upon the deliberations of the meetings. In all the New England states (Massachusetts excepted) the town is the unit for representation in at least the lower branches of the state legislature. Government in New England is, therefore, by towns rather than by counties, as in other states. The town has so many functions and absorbs so much local business that little is left for the county to do. Indeed the county in New England exists principally for judicial purposes; in Rhode Island it exists solely for judicial purposes. As it is today so it has always been: throughout the whole period of her history the focus of New England life has been the town. 'Towns,' says Joel Parke, 'have been the arterial system of New England through which has circulated the life-blood which has invigorated, sustained, and strengthened her, making her expand in her religious, social, educational, benevolent, and political institutions.' The people cling tenaciously to their town system. Boston did not change from town to city government until 1820 when, with a voting population of 7,000, she found that the town meeting could no longer act as a deliberative body. Yet the conditions of population in recent years sometimes make it extremely difficult to administer local government on the town plan. People are moving from the country to the city, depleting some towns and making others too large to meet in mass. The smallest town in New England (census 1900) is Cambridge, N. H., with a population of 17; the two largest are Warwick, R. I., and Brookline, Mass., with a population of 21,316 and 19,985 respectively. It would seem that Cambridge is too small for a unit of government of any kind and that Warwick and Brookline are too large to act as pure democracies. As a matter of experience local government in New England is changing with the new conditions. So long as the population of a place remains below 10,000 (the population of Aristotle's ideal city) town government is usually economical, efficient, and pure, but when the population greatly exceeds that number the interest of the citizens in local matters begins to flag, the town meeting becomes unmanageable, and the town government is in danger of falling into unworthy hands. The remedy is municipal incorporation. The thickly inhabited part of the town secures a charter and becomes a borough or village or city and the people surrender a part of the public business to chosen agents. This change, however, usually does not extinguish town government within the

boundaries of the new municipality, although it does take from it many of its former powers.

While town government in its pure form is found only in New England, modifications of it appear in those w. states whose population contains a strong admixture of New England emigrants, notably in Michigan, Illinois, Wisconsin, Minnesota, and Nebraska. Each of these states has provided by law for a system of local government which resembles more or less closely the New England system. In Michigan, for example, the voters of a township, after they have elected their local officers, meet in the afternoon in mass for the transaction of certain local business, but while they have the form they lack the spirit of the New England meeting, and in fact, the local governments are mostly representative. Consult: Howard, *Local Constitutional History of the United States;* Adams, *Germanic Origin of New England Towns;* Johnson, *The Genesis of a New England State;* Parker, *Origin, Organization and Influence of the Town of New England;* Bemis, *Local Government in Michigan and the Northwest;* Shaw, *Local Government in Illinois;* Fiske, *American Political Ideas;* Bryce, *American Commonwealth* (Vol. I.); Hosmer, *Life of Samuel Adams* (ch. xxiii).

TOWNE SCIENTIFIC SCHOOL. See PENNSYLVANIA, UNIVERSITY OF.

TOWNSEND, CHARLES HENRY TYLER: American entomologist: b. Oberlin, Ohio, 1863, Dec. 5. He studied medicine at Columbian University 1887-90, was assistant entomologist in the United States Department of Agriculture 1888-91, and was then appointed professor of entomology, physiology, and zoology at the New Mexican Agricultural College. He was temporary field agent in the division of entomology of the United States Department of Agriculture in Texas, Mexico, and New Mexico 1894-8.

TOWNSEND, *town'zĕnd,* EDWARD DAVIS: soldier: b. Boston, 1817, Aug. 22; d. 1893, May 11. He was educated at Harvard; graduated at West Point and became 2d lieut. of artillery 1837. He served in the Florida war, and in the troubles 1838-41 on the Canadian frontier; thenceforward his duties were at the headquarters of the army in the adjutant-general's office. He attained the actual rank of colonel 1861 and was brevetted brigadier-general 1864, major-general 1865; retired 1880.

TOWNSEND, EDWARD WATERMAN, American author: b. Cleveland, Ohio, 1855, Feb. 10. He was for some years on the staff of the New York *Sun* and in 1895 became widely known by his *Chimmie Fadden and Major Max.* Later works include *Chimmie Fadden Explains, Major Max Expounds* (1895); *A Daughter of the Tenements* (1896); *Lees and Leaven* (1903); *Reuben Larkmead* (1905).

TOWN'SEND, George Alfred: journalist: b. Georgetown, Del., 1841, Jan. 30. He obtained employment in a Philadelphia newspaper office 1860; was war correspondent of the New York *Herald* for some months 1862; then visited Europe as correspondent of newspapers, meanwhile lecturing on the Amer. civil war; returning to America 1864, he was again a war correspondent; after the war he delivered lectures throughout the country. He chronicled the Austro-Prussian war of 1866 in letters from the field. He adopted the signature 'Gath' 1868. He is author of several books; among them biographies of Garibaldi and Lincoln, a few light dramas, and some novels; among the latter *Dr. Priestley, or the Federalists.*

TOWN'SEND, Luther Tracy, D.D.: Methodist Episc. minister, and author: b. Orono, Me., 1838, Sep. 27. He was educated at Dartmouth Coll. and Andover Theol. Sem., and then was ordained to the ministry. He has been prof. of theol. in Boston Univ. since 1867. He is author of many books, some of which have had wide circulation; among them are *The Bible and Other Anc. Literature in the 19th C., Credo, God-Man, Bible Theology and Modern Thought.*

TOWNSHEND, *town'zĕnd*, Charles, The Right Hon.: English orator and statesman: 1725, Aug. 29—1767, Sep. 4; second son of the third Viscount T. He entered the house of commons 1747, as a supporter of the Pelham (whig) administration. His first great speech was against the Marriage Bill 1753, which gained him great reputation for eloquence. At the dissolution of the whig govt., the Earl of Bute gained him by the offer of the post of sec. at war. On Bute's resignation 1763, T. was appointed first lord of trade and the plantations. By this time the versatility of his political career had obtained him the appellation of 'the Weathercock.' In the Chatham ministry 1766, he accepted the post of chancellor of the exchequer and leader of the house of commons. When Lord Chatham, in a distempered state of mind, abdicated the post of first minister, T. broke loose from all restraint, and manifested immense vanity, ambition, and arrogance. George Grenville, smarting under the defeat of his favorite scheme of taxing America, on one occasion, in the middle of his harangue, turned to the ministers: 'You are cowards,' he said; 'you are afraid of the Americans; you dare not tax America.' T.'s fiery temper was kindled, and he exclaimed: 'Dare not tax America! I dare tax America.' Grenville retorted: 'I wish to God I could see it!' and T. replied: 'I will, I will.' He was not allowed to forget his pledge; and finding the notion of an American revenue agreeable to the court and not unpalatable to the house of commons, he proposed and carried those measures that led ultimately to the separation of the American colonies. T.'s wife was created Baroness Greenwich, and he was about to be intrusted with formation of a ministry when he was carried away by a putrid fever in his 42d year. The difference between his contemporary reputation and his fame is very striking. He was ranked as an orator with Pitt. He was far more popular than the great commoner with the house of commons, in which

assembly he made many speeches whose wit and recklessness alike were unbounded. Burke called him 'the delight and ornament of the house of commons.' Macaulay speaks of him as 'the most brilliant and versatile of mankind,' who had 'belonged to every party, and cared for none.' He married Caroline, daughter and heiress of John, second Duke of Argyle and Greenwich, and widow of the Earl of Dalkeith.

TOWNSHEND (Charles Townshend), second Viscount: English statesman: 1674–1738, June 21; descended from a very ancient Eng. family, settled at Raynham, Norfolk, since the reign of Henry I. His father, Horatio, first Viscount T., had been a prominent member of the Presb. party before the Restoration; and, having been one of the most forward in restoring the monarchy, was by Charles II. made baron 1661, viscount 1682: he died 1687, when his son was only 11 years old. When he was of age to take his seat in the upper house, he adopted his father's politics, but soon became a disciple of Lord Somers, and cordially co-operated with the whigs. He was employed as a diplomatist; was joint-plenipotentiary with Marlborough at Gertruydenberg; and negotiated with the states-general the Barrier treaty, which pledged the states-general to the Hanoverian succession, and England to procure the Spanish Low Countries for the United Provinces, as a barrier against France. In 1712, on formation of the Harley ministry, T. was dismissed from his places, and the Barrier treaty was censured by the house of commons, which voted that T. and all who had been concerned in the treaty were enemies to the queen and kingdom. This persecution raised him from a follower to a leader. He maintained close correspondence with the court of Hanover, and obtained the entire confidence of George I., who, on his accession to the throne of England, made him his chief minister. While George I. was still at the Hague, on his way to his new kingdom, he made T. sec. of state, with power to name his colleague. He selected Gen., afterward Earl, Stanhope, and formed a ministry entirely whig in party character. He strengthened it by the addition of Walpole, who, from being at first paymaster of the forces, was soon made chancellor of the exchequer and first lord of the treasury. The principal act of the govt. was the passing of the Septennial Bill, a bold and unconstitutional act. After the breaking of the South Sea Bubble, and the deaths of Sunderland and Stanhope (q.v.), T. (1721) again became sec of state. But he was no longer the acknowledged leader of the whigs. The superior talent of Walpole, with his financial abilities and his influence in the house of commons, caused a change in the relative position of the two ministers, and converted into rivals and enemies those who long had been friends and colleagues, and who were also family connections (for T. had married Walpole's sister). An unseemly quarrel broke out between them: they seized each other by the collar, and then laid hands on their swords. The interposition of friends prevented a duel; and T., resigning the contest, retired to Raynham to cultivate

his paternal acres. Walpole, on being asked the cause of his difference with his brother-in-law, replied: 'As long as the firm was Townshend and Walpole, all did very well; but when it became Walpole and Townshend, things went wrong, and a separation ensued.' Townshend's temper was resolute and imperious; but he left office with hands absolutely clean from selfish gain. Townshend introduced the turnip into Norfolk from Germany, effecting a beneficial revolution in agriculture. He steadily refused to reappear in public life, and died in a good old age, leaving a high reputation for integrity and steady consistency in sound and constitutional principles of government.

TOWSON, *tow'son*, NATHAN: soldier: 1784, Jan. 22—1854, July 20; b. near Baltimore, Md. He earned distinction by gallantry, and was brevetted major-general 1848.

TOXIC, a. *tŏks'ĭk*, or TOX'ICAL, a. *-ĭ-kăl* [Gr. *toxikŏn*, a poison]: poisonous. TOXIC AMAUROSIS, impaired vision and blindness due to the action of a poison.

TOXICANT, n. *tŏks'ĭk-ant* [Eng. *toxic*]: poison: ADJ. having poisonous effect.

TOXICODEN'DRON. See SUMACH.

TOXICOLOGY, n. *tŏks'ĭ-kŏl'ŏ-jĭ* [Gr. *toxikŏn*, a poison; *logos*, discourse]: that branch of medical science which relates to poisons, their effects, detection, and antidotes. TOX'ICOLOG'ICAL, a. *-kō-lŏj'ĭ-kăl*, of or relating to toxicology. TOX'ICOLOG'ICALLY, ad. *-lĭ*. TOX'ICOL'OGIST, n. *-kŏl'-ŏ-jĭst*, one who is skilled in the science which relates to poisons.—*Toxicology* embraces the physical and chemical history of poisonous substances, the methods of testing for them, their action on the living body, the *post-mortem* results which they occasion, and (according to some writers) the medical treatment that should be adopted. The word has a somewhat far-fetched origin (from Gr. *toxikon* and *logos*). The Greek word *toxikon* signifies 'anything relating to *toxon*, a bow'; hence with the word *pharmacon*, a drug, it was used to designate 'poison for smearing arrows,' and then *poison* generally.

TOXIN, or TOXINE, n. *tŏx'ĭn*, or *-ēn* [from Gr. *toxikon*, from *toxikos*, of the bow, from *toxon*, bow]: in *chem.*, a poisonous base found in animals, caused by tissue-metabolism; a poisonous ptomain; the special secretion of a pathogenic microorganism causing the symptoms peculiar to the disease with which it is associated. See PTOMAIN; BACILLUS; BACTERIA; TUBERCULOSIS; ANTITOXIN; etc.

TOXOPHILITE, n. *tŏks-ŏf'ĭ-līt* [Gr. *toxon*, a bow; *philos*, a lover]: a lover of archery; an archer: ADJ. of or pertaining to archery.

TOY, n. *toy* [an ellipse for *play-toy*, implements of play. Low Ger. *tüg;* Dut. *tuig;* Dan. *töi*, materials, implements: Ger. *zeug*, materials, lumber; *spielzeug*, toys]: a child's plaything; a bauble; that which is valued for

its look only, or for amusement; in *OE.*, play; sport; amorous dalliance; old story; odd conceit; wild fancy: V. [OE. *togge,* to tug (see TUG)]: to handle amorously; to trifle; to treat foolishly; to play with. TOY'ING, imp. TOYED, pp. *toyd.* TOY'ISH, a. *-ĭsh,* trifling; playful. TOY'ISHLY, ad. *-lĭ.* TOY'ISHNESS, n. *-nĕs,* the quality or state of being toyish. TOY'SOME, a. *-sŭm,* or TOY'FUL, a. *-fûl,* full of dalliance; wanton. TOYSHOP, a shop where toys are sold. *Note.*—Toy as a noun and verb have really different roots, but the senses have become so mixed up that it was thought better to group them together.

TOY, CRAWFORD HOWELL, D.D., LL.D.: educator: b. Norfolk, Va., 1836, Mar. 23. He graduated at the University of Virginia 1856; was ordained 1860 as a Baptist minister; then was teacher in different educational institutions; chaplain in the Confederate army during the secession war; studied Semitic languages in Berlin 1866-68; and afterward was professor of Hebrew in the Southern Baptist Theological Seminary; since 1880 he has held the chair of Hebrew at Harvard University. He is author of *History of the Religion of Israel;* and has gained note as a free critic of the Hebrew Scriptures. Other publications are: *Quotations in the New Testament* (1884); *Judaism and Christianity* (1890); *Commentary on Proverbs* (1899); etc.

TOYN'BEE HALL: centre for charitable and educational work in the Whitechapel district of London; named after Arnold Toynbee (d. 1883), in commemoration of his earnest endeavors to better the condition of the poor. It is conducted by graduates of English universities, and is one of the 'university settlements.' About 15 university men are in residence at Toynbee Hall, most of whom give their whole time to the beneficent work, living at their own charges. The Toynbee Hall men have for their object the moral elevation and the mental improvement of the people among whom they have established themselves, and they are also leaders in all charitable and reformatory effort in their district. In their hall during the winter the lectures of the university extension are given; also, classes are conducted for instruction in various branches of knowledge, particularly in political economy. The library comprises 4,000 volumes. Among the annexes of Toynbee Hall is a sort of college affording residence accommodation to 40 young men.

TRABECULA, n. *tră-bĕk'ū-lă,* TRABEC'ULÆ, n. plu. *ū-lē* [L. *trăbecŭla,* a little beam or rafter—from *trabs,* a beam]: in *bot.,* cross-bar-like projection extending across the cell cavity of the ducts of some plants, or across the cavity of the sporangium of many mosses; plu. in *anat.,* fibrous cords or tissues which ramify the substance of various soft organs, such as the spleen. TRABECULAR, a. *tră-bĕk'ū-lĕr,* of, pertaining to, or of the nature of the bands or fibres called trabeculæ. TRABECULATE, a. *tră-bĕk'ū-lāt,* traversed by trabeculæ.

TRACE, n. *trās* [F. *trace;* It. *traccia*, a trace, a point of the foot: Sp. *traza*, first sketch, outline: F. *tracer*, to trace, pursue—from L. *tractus*, pp of *trahĕrĕ*, to draw]: mark or visible appearance left by something passing; a footstep; a vestige; a token; a track; remains; minute quantity: V. to delineate with marks; to follow by the visible marks left; to follow by footsteps or tracks; to follow exactly; in *OE.*, to walk over; to walk; to travel. TRA'CING, imp.: N. course; regular track or path; a delineation by visible marks; a plan; a sketch. TRACED, pp. *trāst*. marked out; followed by footsteps. TRA'CER, n. *-sėr*, one who traces. TRACE'ABLE, a. *-să-bl*, that may be traced. TRACE ABLY, ad. *-blĭ*. TRACE'ABLENESS, n. *-bl-nĕs*, the state of being traceable. TRA'CERY, n. *-sėr-ĭ*, artistic work in fanciful and flowing outlines; certain kinds of ornamental stone-work, as in Gothic windows (see below). TRACING-PAPER, a semi-transparent paper used in copying sketches or outlines, over which it is laid (see PAPER).

TRACE, n. *trās*, usually in the plu. TRACES, *trā'sĕz* [OE. *trayce*, horses' harness: OF. *traict;* F. *trait*, a team-trace, a shaft—from L. *tractus*, a drawing or dragging—from *trahĕrĕ*, to draw]: one of the two straps, ropes, or chains by which a vehicle is drawn by the horse or other draught-animal to which it is harnessed; a 'tug.'

TRA'CERY: in *arch.*, ornamental open-work in stone with which the arches of Gothic windows are filled for support of the glass. This open-work varies with every variety of Gothic architecture. Gothic windows were at first narrow, and covered with a simple arch. Then two windows were grouped, and an arch thrown over both. The space thus inclosed became part of the window, and was at first pierced with a circle, quatrefoil, or other open-

Fig. 1.

ing (fig. 1). When three or more windows were grouped under one arch, the *shield* or space in the arch became larger, and was pierced with apertures of various forms. In the early Pointed styles these were usually circles filled with cinquefoils, trefoils, etc. (fig. 2). During the Decorated period the T. became more varied, composed of squares, triangles, and other forms, filled with foils, and

constituting the respiratory system. For the general subject, see ANATOMY; LUNGS; NOSE AND THROAT; RESPIRATION.

TRACHEARIA, n. plu. *trăk'ĕ-ā'rĭ-ă* [Eng, *trachea,* the windpipe]: the division of Arachnida which breathe by means of tracheæ; also named TRACHEATA, n. plu. *trăk-ĕ-ā'tă.* TRACHEIDES, n. plu. *trăk-ĕ-ĭ'dēs* [Gr. *eidos,* resemblance]: in *bot.,* spiral vessels which serve as air-conducting tubes after the protoplasm and cell-sap have disappeared.

TRACHEOTOMY, n. *trăk'ĕ-ŏt'ō-mĭ* [Eng. *trachea,* the windpipe; Gr. *tomē,* a cutting]: in *surgery,* operation of making an opening in the windpipe. LARYNGOT'OMY is for inconvenience included here.—The air-passages may be opened in three different situations—namely, through the crico-thyroid membrane (see LARYNX), when the operation is termed Laryngotomy; through the cricoid cartilage and the upper rings of the trachea—Laryngo-tracheotomy; and through the trachea, below the isthmus of the thyroid gland—Tracheotomy proper. Laryngotomy and tracheotomy are more frequent than laryngo-tracheotomy, to which no further allusion is required. Laryngotomy is more quickly and easily performed, especially in adult males, and is less dangerous; tracheotomy is more difficult, tedious, and dangerous, but must be selected in some cases, e.g., where there is necessity for introducing the forceps. When the operation is completed, a large curved tube to breathe through is inserted in the aperture, and secured round the neck with a tape.

A double tube or cannula has many advantages, as by withdrawing the inner one, which should slightly project at its lower extremity, it may be cleared of any mucus or blood that may have accumulated in it without disturbing the wound. The calibre of the inner tube should always be sufficiently large to admit as much air as usually passes through the chink of the healthy glottis. The after-treatment is much the same as that required for wounds in the Throat (q.v.). Among the cases in which tracheotomy may be required are cut throat, acute laryngitis, croup, diphtheria, chronic inflammation and ulceration of the larynx, necrosis of the laryngeal cartilages; tumors, excrescences, or epithelial growth within the larynx; tumors (bronchocele, abscesses, etc.) external to the larynx or upper part of the trachea, and impeding respiration by pressure, etc. Laryngotomy may be required in cases of spasm of the glottis, in inflammation with œdema of the cellular tissue of the larynx, in inflammation of the tongue, in tonsillitis and pharyngitis if the swelling is so great as to produce symptoms of suffocation, etc.

TRACHOMA, *trā-kō'ma* [from Gr. *trachoma,* roughness—from *trachus,* rough]: in *surgery,* a granular condition of the mucous covering of the eyelids, often accompanied with haziness and vascularity of the cornea; granular lids.

TRACHYTE, n. *trăk'īt* [Gr. *trachus*, rough]: in *geol.*, a volcanic rock, rough and gritty to the touch, composed chiefly of Felspar (q.v.), confusedly agglomerated in crystals, which are usually very small or wholly indistinguishable, and lustreless. Much of the T. is like ashes in appearance, but hardened into stone; and, in fact, such it is in many instances, if not in all—submarine volcanic ash, indurated but light on account of its minutely vesicular structure, due to the presence of steam in its formation. Crystals of mica and hornblende also are often present, and more rarely crystals of augite, all imbedded in a felspathic paste. T. in many varieties abounds in the Rocky Mt. region; and a beautiful purple kind is used for fine buildings in Denver, Colo., and elsewhere. By some geologists T. has been made the name of a class of volcanic rocks, in which Clinkstone, Obsidian, and Pumice are included. TRACHYTIC, a. *tră-kĭt'ĭk*, pertaining to or consisting of trachyte. TRACHYTIC PORPHYRY, a porphyry composed essentially of trachyte.

TRACK, n. *trăk* [OF. *trac*, a beaten way, a trade or course: Ger. *trapp*, the sound of the footfall, a foot-print: Norw. *trakka*, to trample: Dut. *trekken*, to draw, travel, march: confused in old authors with *tract*, and in old and modern authors with *trace*]: a footmark; a mark or marks left upon the way by something that has passed along; a beaten path; course; road; way; in *rail.*, the permanent way: V. to follow by the marks left upon the way; to tow a vessel by a rope, as into a harbor or along a canal. TRACK'ING, imp. TRACKED, pp. *trăkt*. TRACK'ER, n. *-ĕr*, one who follows by the marks or footsteps. TRACK'LESS, a. *-lĕs*, without a road or path; untrodden. TRACK'LESSLY, ad. *-lĭ*. TRACK'LESSNESS, n. *-nĕs*, the state of being trackless or without a track. TRACK-ROAD, a towing-path. TO MAKE TRACKS, in *slang*, to depart.

TRACT, n. *trăkt* [L. *tractus*, a drawing or dragging, a district; *tractātus*, a handling, a treatise; *tractus*, pp. of *trahĕrĕ*, to draw]: extent; expanse; stretch or area of land or water of indefinite extent; region; a short treatise on a particular subject in the form of a pamphlet; length; extent; in *OE.*, discourse; explanation; also used for *track* in OE.: V. in *OE.*, to trace out. TRACTARIAN, n. *trăk-tā'rĭ-ăn*, one of the writers of the Oxford '*Tracts* for the Times' (1833–41); a supporter of Tractarianism: ADJ. of or pertaining to Tractarianism. TRACTA'RIANISM (see below). TRACTATE, n. *trăk'tāt*, a small book; a tract; a treatise. TRACTS FOR THE TIMES, or OXFORD TRACTS (see TRACTARIANISM).—SYN. of 'tract, n.': region; quarter; district; treatise; dissertation; essay; monograph.

TRACTABLE, a. *trăk'tă-bl* [L. *tractab'ĭlĭs*, quiet, manageable—from *tractārĕ*, to handle, to manage—from *tractus*, pp. of *trahĕrĕ*, to draw]: easily led, managed, or taught; docile. TRAC'TABLY, ad. *-blĭ*. TRAC'TABLENESS, n. *-bl-nĕs*, or TRAC'TABIL ITY, n. *-bĭl ĭ-tĭ*, the state or quality of being tractable or manageable; docility.

TRACTARIANISM.

TRACTA'RIANISM: remarkable and important movement in the English Church during the second quarter of the 19th c., consisting in an endeavor to revive and bring into prominence the principles of antiquity, catholicity, and authority recognized in some portions of the Anglican formularies, in reaction from the Prot. sentiments long and widely prevailing. The name is from a series of papers entitled *Tracts for the Times*, pub. at Oxford 1833–41, hence called the 'Oxford Tracts.'—The agitation of the question of Rom. Cath. emancipation led, in some cases, to the study of Rom. Cath. theology, with a view to determine the real grounds of difference between the Roman and Anglican churches; and the religious and æsthetic tone of Wordsworth's poetry, still more developed in Keble's *Christian Year* (1828), may have influenced some minds in a direction to which T. was akin. The lectures of Bp. Lloyd, when Regius prof. of divinity at Oxford about 1823, on the Prayer-book and the Council of Trent, are considered to have opened the way to the teaching of the *Tracts*. But the immediate origin of the movement appears to have been the alarm aroused for the interests of the English Church on occasion of the suppression by the reform govt. of some of the Irish sees, and the threatened alienation of Irish church property. It is said that about that time a meeting of clergymen took place at Hadley, in Suffolk, at which measures were concerted for opposing the alleged latitudinarian tendencies of the day, and restoring the high-church theology of the Anglican divines of the 17th c. The chief promoters of T. were the Rev. John Keble (q.v.), author of the *Christian Year*, and formerly prof. of poetry at Oxford; the Rev. John Henry Newman (q.v.) and R. H. Froude, fellows of Oriel; the Rev. E. B. Pusey (q.v.), Regius prof. of Hebrew and canon of Christ-Church; the Rev. Isaac Williams, fellow of Trinity, author of *The Cathedral, and Other Poems;* the Rev. Hugh Rose of Cambridge; and others. The *Tracts* were issued anonymously, and, with articles in the *British Critic* by the same writers, produced great effect, especially among the clergy. Protestant principles were openly discountenanced, and tenets closely resembling those of the Church of Rome were boldly advanced. The doctrines of Apostolical Succession Priestly Absolution, Baptismal Regeneration, the Real Presence, the Authority of the Church, and the Value of Tradition, which had long lain hid in the language of the Prayer-book, were widely revived and taught, and caused much alarm in some quarters: though it must be admitted that those principles had always been held by a portion of the English clergy, and have in some degree a place in the Book of Common Prayer. The study of the Fathers and old divines, of church history and ancient liturgies, was greatly revived in the universities and among the clergy, and a host of publications inculcating with more or less extravagance the same views issued from the press. The movement proceeded, notwithstanding the general opposition of the authorities, till it culminated in the publication, by the Rev. J. H. Newman, of Tract No.

90, designed to show that much Roman doctrine might be held consistently with subscription to the Thirty-nine Articles. This, being held to favor a 'non-natural' interpretation, met general condemnation, and led to the termination of the series, to the resignation by Newman of the vicarage of St. Mary's, Oxford, and subsequently to his secession 1845 to the Church of Rome. In this step he was followed by many of his friends and associates, though the other leaders of the movement continued in the English Church. With Newman's secession the Tractarian movement terminated; but its effect remains in several visible results. 1. There was a revival and strengthening of the high-church party, which still maintains to a great extent the principles advocated in the *Tracts;* and though checked in England by some judicial decisions, e.g., the Gorham (q.v.) judgment, in the endeavor to acquire exclusive power, has gained great and increasing influence in the church. 2. Side by side with the revival of 'catholic' doctrines there has been great development of ritual. Though ritual was not in itself a prominent object in the minds of the leaders, the Tractarian movement was early marked by introduction of various alterations in the performance of divine service, such as the use of the surplice instead of the gown, intoning the prayers and singing the responses, elevation of the communion table into an altar, substitution of low open benches for high pews—all of which, though claiming to be a restoration of ancient usage and having the authority of the law, were regarded with alarm as approximating to the Church of Rome (see RITUALISM). 3. Another effect was the remarkable impulse given to the building and restoration of churches, and the revival of Gothic architecture, in all parts of England: this has given a character to the ecclesiastical buildings of the 19th c. which will mark them for ages to come. 4. The movement has undoubtedly caused the secession of many English clergy and laity, some of them men of eminence, to the Church of Rome, which has greatly increased the strength and influence of the Roman communion in Britain and America, and caused great scandal to zealous Protestants. Lastly, the movement may be admitted to have involved an awakening of the Anglican Church from lethargy, with the result of an increase of learning, piety, and devotedness among the clergy, and the establishment of colleges, sisterhoods, and other religious and charitable institutions; and latterly to have developed a noble zeal in bringing Christian forces to bear on the vast indifferent masses and on the lowest and most degraded. —The daughter church in the United States has naturally shared in the general effects of this movement.

TRACTILE, TRACTION: see under TRACTOR.

TRAC'TION-EN'GINE: self-propelling engine, for drawing loads on common roads. It has been a favorite idea with mechanicians to make a light carriage, for use on ordinary roads, containing a steam-engine and boiler to propel itself. No doubt such a vehicle for light loads can

be easily made, but its cost will be great in proportion to any service that it can render.

The true application of steam on common roads is in the drawing of heavy loads which would require an inconveniently large number of horses. Engines for this purpose are called *traction-engines*, and their use is increasing. Traction-engines or road-locomotives are now made by the chief makers of agricultural implements. These are of different types—some for drawing very heavy loads; some for lighter work, such as drawing a threshing-machine from place to place over moderate gradients; these latter being adapted also for a variety of purposes for which a self-moving has been found to possess great advantages over an ordinary portable engine. Some recent forms of traction-engines have driving-wheels 7 or 8 ft. in diameter. One form has thick India-rubber tires—rings of India-rubber, 4 or 5 inches thick, stretched over the rim of the wheel, and protected by a flexible circle of steel shoes from damage by stones, etc. The advantage of such tires is the greater adhesion (in proportion to weight) which they give to the engine, and the saving the machinery from shocks and jars. Their great cost is a hindrance to their adoption. A general idea of the early machines may be obtained from the following description of a road locomotive built by Messrs. Aveling and Porter, of London: Weight of engine complete, 5 tons, 4 cwt. (11,648 pounds); diameter of steam cylinder, $7\frac{3}{4}$ inches; stroke of piston, 10 inches; revolution of crank to one of the driving wheels, 17; diameter of driving wheels, 60 inches; breadth of tire, 10 inches; weight of tires, 450 pounds each; length of boiler shell, 30 inches; thickness of shell, 7-16 of an inch; thickness of fire-box sheets outside, $\frac{1}{2}$ inch; load on driving wheels, 4 tons, 10 cwt., or 10,080 pounds. The driving pinion on the crank-shaft was made so that it could be slipped out of gear, and thus allow the engine to be kept running when the locomotive was at rest. The engine valve gear consisted of the standard arrangement of three-ported valve and Stephenson link with reversing lever so generally used on locomotives, while the feed pump, $1\frac{3}{4}$ inches in diameter and $3\frac{1}{8}$ inches stroke of plunger, was driven by an eccentric keyed on the crank-shaft. The connection between the gearing and the driving wheels was effected by a device known as the differential gear, in which one driving wheel turns freely on the axle while the other driving wheel is keyed fast. A bevel gear is bolted to the hub of the free wheel, and a similar gear is keyed to the driving axle, between which revolves a spur gear which is driven by the engine and which carries two small bevel pinions which engage both bevel gear, so that when it is turned it carries with it both driving wheels at the same time with equal angular velocities, the effort exerted by the engine being equal at both wheels at all times.

TRACTOR, n. *trăk'tėr* [L. *tractus*, a drawing or drag-

1. Traction Engine working on Canal.
2. A 110-Horse Power Traction Engine hauling lumber in the Sierra Nevada Mountains.

ging—from *trahĕrĕ*, to draw or drag]: that which draws or is used for drawing. TRAC'TORY, n. *-tėr-ĭ*, or TRACTRIX, n. *trăk'trĭks*, in *geom.*, a curve of which the tangent is always equal to a given line. TRAC'TILE, n. *-tĭl*, that may be drawn out in length; ductile. TRAC'TION, n. *-shŭn* [F.—L.]: the act of drawing, or the state of being drawn; attraction. TRAC'TIVE, a. *-tĭv*, that pulls or draws; capable of pulling. TRAC'TORA'TION, n. *-tėr-ā'shŭn*, a disused method of treating diseases (see PERKINS, ELISHA). ELECTRIC TRACTION (see ELECTRIC RAILWAY).

TRACT SOCI'ETIES. See RELIGIOUS TRACT SOCIETY.

TRACTRIX, in Geometry: a plane curve, invented by Huyghens (1693), which has the property that the length of the tangent from its point of contact to a fixed straight line is constant. It is the path of a particle without inertia attached to a string the other end of which is drawn along a fixed straight line.

TRACY, DESTUTT DE (1754-1836): a French philosopher of the sensationalistic school of Condillac, whose doctrines he modified in some particulars. In particular he taught that sensation of and by itself could not give rise to knowledge of the external world. This comes to us through the exercise of our own wills and in connection with the resistance which we find opposed to the execution of our acts by the physical matter of the universe. Tracy was educated for a military career. In 1789 he became a member of the States-General. He belonged to the revolutionary party and served with Lafayette. As a senator under the empire he voted to overthrow Napoleon. He was a member of the Academy and is ordinarily classed with the so-called ideologists among French philosophers.

TRACY, *trā'sĭ*, BENJAMIN FRANKLIN: lawyer: b. Owego, N. Y., 1830, Apr. 26. He received an academical education; was admitted to the bar 1851; became district attorney of Tioga co., N. Y., 1854; and was re-elected 1856. In 1861 he was elected to the legislature; 1862 organized three regiments for the Union army; and, after serving through the Wilderness campaign and receiving the brevet of brigadier-general, was placed in command of the Elmira camp of Confederate prisoners, and remained there till the close of the war. He was appointed United States district attorney 1866; declined reappointment 1868; was counsel for the defense in the Tilton-Beecher trial; and served a short time as a judge of the New York court of appeals. In 1889 he became secretary of the navy in President Harrison's cabinet, and 1890, Feb. 3, his wife, daughter, and wife's maid were burned to death by fire in his Washington residence, and he narrowly escaped. His administration of the naval department was notably careful, thorough, and energetic. In 1897 he was nominated as the republican candidate for the first mayor of the enlarged New York. The republican vote was divided, and he was defeated by a great majority.

TRADE, n. *trād* [AS. *træd*, trod; *tredan*, to tread: Dan. *træde;* Goth. *trudan*, to tread (see TREAD, of which *trade* is a derivative)]: the proper meaning of *trade*, frequently found in *OE.*, is trodden way, beaten path or course, and, hence, a way of life; the handicraft which a person has learned, and which he carries on for a livelihood; mechanical or mercantile employment, as distinguished from a learned profession: occupation: the body of persons engaged in the same particular employment; the business of buying and selling by barter or for money; commerce: in *OE.*, a standing practice; habit; custom: V. to engage in selling and buying for money or by barter; to carry on commerce; to deal; to traffic; to sell or exchange in commerce. TRA'DING, imp.: ADJ. carrying on commerce; as applied to politicians and public men, venal; having the character of an adventurer; having a price: N. the act of one who carries on a trade; the business of carrying on trade. TRA'DED, pp.: ADJ. in *OE.*, versed; practiced TRA'DER, n. *-dėr*, one engaged in buying and selling commodities; vessel sailing with goods for trading. TRADE CORPORATIONS (see CORPORATION: JOINT-STOCK COMPANY). TRADE-PRICE, the price after deducting discount allowed to retailers; the price at which wholesale traders supply goods to retailers. TRADE-SALE, a sale by auction for any particular trade, especially booksellers or publishers. TRADESFOLK, n. *trādz'fōk*, persons engaged in trade. TRADES'MAN, n. *-măn*, a craftsman; a mechanic; a common name for a shopkeeper. TRADE-MARK, symbol impressed by a tradesman or manufacturer on his own goods (see below). TRADES-PEOPLE, persons engaged in trades, especially shop-keeping. TRADE-UNION, or TRADES-UNION, combination among workmen having in view the settlement of the proportion which wages should bear to the profits of the employers, and the redress of grievances (see below). TRADE-PROTECTION SOCIETIES (see COMMERCIAL REGISTER). TRADE-WINDS, called also TRADES, winds which hold a certain steady course; winds in or near the torrid zone, which n. of the equator blow from the n.e., and s. of the equator blow from the s.e. (see WIND).—SYN. of 'trade, n.': commerce; traffic; dealing; profession: occupation; office; employment; calling; business; vocation.

TRADE, BOARD OF: in the United States, an assoc. of business men for furtherance of trade, as by suggesting and encouraging suitable legislation in regard to tariffs, banking, insurance, shipping, etc.; a Chamber of Commerce (q.v.).

In the United Kingdom, the board of trade is a department or group of departments of government more correctly designated 'The Lords of the Committee of Her Majesty's Privy Council appointed for the Consideration of All Matters relating to Trade and Foreign Plantations.' In 1660 Charles II. created two separate councils for trade and for foreign plantations, which were consolidated 1672. In 1786 the now existing dept. was established for consideration of all matters relating to trade and the colonies. The board is now divided into five depart-

ments: (1) statistical and commercial, (2) railway, (3) marine, (4) harbor, (5) financial. The presidentship has been held since 1864 by a cabinet minister.

The functions of the board of trade are partly ministerial, partly judicial, and have been greatly enlarged by successive statutes. The board is charged with the general superintendence of all matters relating to the mercantile marine; and with supervision of railways and railway companies, both as to their original formation and their working. Many matters relating to the interests of trade which come before other governmental departments are referred to the board of trade for information or advice thus, there are communications with the foreign office regarding the negotiation of commercial treaties, and with the treasury regarding alterations in the customs.

A statistical dept. of the board collects and publishes tables of classified information regarding the revenues, population, commerce, wealth, and moral and economical condition of the United Kingdom and its dependencies, and prepares a selection from the statistics of foreign countries, and a monthly account of trade and navigation. All applications by companies or private persons for charters of incorporation are referred to the board of trade; and among its functions is the registration of joint-stock companies and of copyright in designs.

TRADE, LIBERTY TO: one of the rights incident to all persons by law in Great Britain and the United States. So absolute is this right that it is considered by courts of law to be an illegal and void covenant when a person, however deliberately, engages never to trade, inasmuch as it is against public policy to support it. In the sale of the good-will of a business, if a person engage absolutely not to carry on a particular business anywhere, his engagement is void; but it is competent to engage not to carry on a particular trade within a certain specified reasonable distance—as 20 or 30 m.—from a certain point, the reasonableness being estimated according to the nature of the trade and locality. If such an engagement were not legal, it would be impossible to negotiate the sale of the good-will of a business. Though, at common law, every man is free to carry on what trade he pleases, still there are many lawful trades subjected to certain restrictions, either ostensibly for purposes of revenue, or for protecting the public from certain evils attending such trades; e.g., see cross-references under LIQUOR: also BEER ACTS: GUNPOWDER, LAWS RELATING TO.

In Britain, the laws or customs of the ancient corporations and guilds, which formerly impeded trade by imposing certain conditions, were abolished 1835: the City of London, however, was excepted, and some of the ancient restrictions still flourish there (see NAVIGATION LAWS).

TRADE'-MARK: symbol, figure, monogram, or other device affixed by a manufacturer to his goods as a distinguishing mark to indicate their origin and genuineness. The earliest trade-marks seem to have been the water-marks in paper. The most ancient known water-mark

is found on a document dated 1351. The use of these marks is an important privilege, as concerns both producer and consumer. A T.-M. may comprise a newly coined word, as 'Pearline,' or a combination of words, as 'Yankee Soap,' or a combination of letters, as 'A B C.' A geographical name is not usable as a T.-M.; nevertheless, it may sometimes be unlawful to use such geographical name, as is seen in the judgment of the court in the case of the 'Akron Cement Co.' *vs.* the manufacturers of 'Onondaga Akron Cement.' The court held that while the formula 'Akron Cement' cannot be a T.-M., the employment of it to designate cement not made at Akron is a fraud both on the public and on the plaintiffs. But the line between a valid T.-M. and an invalid one is not in all the adjudged cases clearly perceptible. Thus, it has been held by courts that 'snow flake,' as a designation of a certain kind of biscuits or crackers, is a 'mere description,' and not a proper T.-M., while the formula 'Insurance Oil' is a valid T.-M. A corporate name, a firm name, etc., though they are not trade-marks, are protected by the law.—In order to facilitate proof of property in trade-marks, congress provides for their registration at the patent-office. The U. S. govt. has concluded with many foreign govts. treaties for mutual protection of trade-marks. The treaty with Great Britain provides that every citizen of the United Kingdom and of the United States shall, each in the country of the other, possess with regard to trade-marks the same rights as native citizens, or the same rights 'as are now granted or may hereafter be granted to the citizens of the most favored nation.'—See COPYRIGHT.

TRADE SCHOOL: school for teaching mechanic arts practically. It differs from a technological institute in that the latter is concerned not less with the theory (or scientific principles) of industrial arts than with the manual operations, while the T. S. undertakes to teach only manual dexterity. It differs also from a manual-training school (as that term is usually understood) in that the purpose of the T. S. is to teach trades, i.e., to make of the pupil a carpenter, brick-layer, etc., while the manual-training school is part of a system of 'symmetrical education,' i.e., of education of the bodily powers and aptitudes as well as of the mental and moral. Thus the T. S. is in fact designed to afford the advantages of trade apprenticeship: whatever instruction it affords outside of that is incidental. The T. S. of New York has day and evening courses of trade-instruction for 3–5 mos. After one term, young men, it is asserted, can earn partial if not full wages in a trade. Some associations of master-tradesmen, e.g., plumbers, as also some private firms, industrial colleges, asylums, reformatories, and the Pratt Institute of Brooklyn, N. Y., the Free Institute of Worcester, Mass., and the Drexel Institute of Philadelphia, conduct trade schools. The trades taught in the New York T. S. are bricklaying, plumbing, carpentry, painting, stone-cutting, blacksmithing, tailoring.—See TECHNICAL EDUCATION.

TRADE-UNION.

TRADE'-UNION: association of workmen for the purpose of securing as favorable conditions of labor as possible, and for mutual assistance in contests with employers. Under this designation trade-unions date from about the middle of the 18th c., and were successively formed in consequence of the gradual disintegration of the solidarity formerly existing between employers and workmen. This disintegration is more immediately attributable to the rapid development of trade, the transference of the mastership of the great industries into the hands of large capitalists, and especially the introduction of machinery, which completely revolutionized the system of labor: see GUILD.

Disputes between employers and workmen came to light after the great pestilence of 1349, when in England it was enacted that carters, plowmen, and agricultural servants generally should be content with their previous rate of liveries and wages; they were to continue to be paid in kind where payment in kind had been customary; they were forbidden to hire themselves for the day, but must take service for a year or other fixed period; a rate of wages was fixed for weeders, haymakers, mowers, and reapers; and their hiring was to be in public. In 1363, the diet and clothing of artificers and servants were fixed by act of parliament, and clothiers were required to make, and tradesmen to sell, cloth of a regulated quality at a regulated price. The 3d Edward III. c. 9, and the 3d Henry VI. are directed against combinations of workmen. but only in the building trades: in fact, against only the journeymen members of the (operative) masons' lodges. One of the ordinances, however, of the 'Master-Shearmen' of 1350 shows that, prior to this date, journeymen in this trade had had recourse to strikes, and it was consequently ordained that henceforth all such disputes be settled by the warden of the trade. In 1562, by the 5th Eliz., c. 4, all previous enactments bearing on the customs and usages of the craft-guilds were codified, and their provisions extended to all the handicrafts of the time. No one, it was ordained, could exercise either as master or journeymen any art or manual occupation, except he had been brought up therein at least seven years as an apprentice. No one was to be bound apprentice who was not under 21 years of age. For three apprentices there was to be one journeymen, and for every apprentice more than three, another journeyman. No journeyman was to be taken for less than a year, and no servant to leave or be put away under less than a quarter's warning. There were definite regulations for hours of work and rate of wages. The 1st James I. c. 6, extends the power of the justices and town magistrates to fix the rate of wages for all laborers and workmen whatsoever.

A 'Report and Minutes of Evidence on the State of the Woolen Manufactures of England,' 1806, July 4, explains how in the 18th c. woolen manufactures were carried on by small masters in their own houses, in villages or in detached places where, besides, they often cultivated a small piece of land. The number of such small masters in the

environs of Leeds was then estimated at 3,500. Every master had served a seven years' apprenticeship. Though the 5th Eliz. was unknown, its regulations were fully observed. In Harnuley, a cloth-workers' village of 4,000 to 5,000 inhabitants, there were 97 apprentices bound for seven years, and only four for a shorter period. As a rule, all worked in the master's house. It was allowable for the apprentice, at the completion of his seven years, to settle as a master, but usually he worked one or two years longer as a journeyman. Slackness of trade did not usually stop work. The master seldom worked to order, but sold his cloth in the 'cloth-halls,' of which there were two in Leeds. No cloth-worker could bring his wares to those halls unless he had served the regular apprenticeship. As a rule, journeymen were hired by the year, and besides board, lodging, and washing at their master's, had each an annual wage of £8 to £10. During a stagnation of trade, it was not customary to dismiss the journeymen, and losses were equalized all over the trade.

This system was entirely changed by machinery. The rich merchants became manufacturers, and erected mills. As early as 1720, according to a report of a committee of the house of commons 1757, the custom of assessing the wages by the justices appears to have fallen into disuse, a neglect which led to reduction of wages by the masters, and to combinations by the workmen. An act of 1725 prohibited such combinations, and by an act of 1726 justices were enjoined to fix the rate of wages. In consequence of a petition from the masters, the justices did not comply with the act of 1726. A riot among the weavers ensued, which involved losses estimated at £15,000 to £16,000. In 1756, the justices were by another act re-ordered to settle the wages in the woolen manufactures yearly. Permanent trade societies were not formed among the woolen workmen till that manufacture passed from the domestic to the factory system, when the masters began to set at naught the provisions of the 5th Eliz., and to employ in their mills workers who had served no apprenticeship, as also a large number of women and children, whose labor was much cheaper. The cloth-workers at Halifax, both small masters and journeymen, finding their bread taken from them, formed a Union or 'Institution,' as it was then called 1796. Acts of parliament were passed 1799 and 1800 suppressing this Institution, and severely prohibiting all combinations of workmen; the effect of which was only to make the workmen combine under the cloak of Friendly Societies (q.v.). In response to a petition from the master manufacturers of w. and n. England, the 5th Eliz. c. 4, and all previous enactments of like nature were, by act of parliament 1803, suspended for one year in the woolen manufacture. This suspension was renewed in the next and following years, till in 1809 these laws were finally repealed. The workers again formed an 'Institution' in 1803, which spent £10,000 to £12,000 on petitions to parliament. The master manufacturers, finding that the Institution aimed at maintaining the 5th Eliz., required their

workmen to leave that body, and on their refusing to do so, discharged them. On the repeal 1809 of the 5th Eliz. and previous acts to the same effect, combinations among workmen became chronic.

Of earlier date than the Cloth-workers Institution was the Shipwrights of Liverpool Trade Soc., and still earlier was that of the Hatters, who were specially protected by the 5th Eliz., 8th Eliz., and 1st James I., and who now felt aggrieved at the 'sweating system' which had been introduced in their trade early in the 18th c.; as also at the excessive number of apprentices who were crowding out the journeymen. In opposition to the efforts of the Workmen's Society, the Master Hatters, 1777, petitioned parliament for repeal of the legislative restrictions in regard to the number of apprentices, and for prohibition of combinations among the workmen; both of which points were conceded, within certain limits, by the 17th George III., c. 55. An inquiry by a committee of the house of commons into the state of framework-knitting brought out the fact, that for about 20 years wages in that trade had been constantly falling, while the prices of food had been rising. Two bills (1779 and 1812) for regulation of their trade having been rejected, the framework-knitters entered into a Union 1814. In calico-printing, the introduction of machinery affected the workmen most injuriously. In Lancashire there were 55 apprentices to 2 journeymen; in Dumbartonshire, 60 apprentices to 2 journeymen. By employing apprentices the masters saved a third in wages, and in case of work being spoiled by the boys a proportionate deduction was always made from their wages.

Trade-unions soon spread over the kingdom, and gradually embraced nearly all the members of all the trades. Employers, on the other hand, leagued themselves into unions, and endeavored to counteract the trade of societies by lock outs and by mutual support. In 1802 was passed the 'Moral and Health Act,' called forth by the terrible epidemic fevers in n. England, especially in Manchester, resulting from the factory system there in operation. The Cotton Mills Act of 1819 limited the age of children admissible to factories to not less than nine years, and the hours of labor from the ages 9 to 16 to 12 hours a day, exclusive of meal-time, night-work being also prohibited. Lord Althorp's (the Earl of Shaftesbury—q.v.) Act of 1833 prohibited night-work to all persons under 18 years in cotton, woolen, worsted, hemp, flax, tow, and linen spinneries, and weaving-mills; and fixed the maximum hours of work from the ages 9 to 13 at 48 per week, and from the ages 13 to 18 at 69 per week. Four factory inspectors were also appointed, and invested with the penal jurisdiction of justices of the peace. In 1842, a Mining Act was passed prohibiting underground work by women in general, and by boys under 10 years, but imposing no restriction on the time of labor, nor on night-work. The second report of the *Children Employment Commission* led to the passing of the

Factory Act of 1844, which reduced the working time for children employed in textile industries, and the Printing Works Act of 1845 contained similar provisions. In 1847 was passed the Ten Hours Act, applying to all young persons and women; and to check a 'relay' expedient by which it was sought to elude its provisions, an act was passed 1850 reducing the legal working day for all young persons and women to 6 A.M.—6 P.M., and fixing the meal-time within these hours. Gradually all trades in Britain, and following Britain, on the continent, were brought under the protection of more humane laws, a result due in large measure, directly or indirectly, to the action of trade-unions.

The ancient common law left little freedom of combination to workmen for regulating wages, shortening the hours of labor, or otherwise bettering their condition. In England, the boasted freedom of our Saxon ancestors was very similar to that in the southern states of N. America before the secession war, since it was all enjoyed by the upper class, to whom the inferior persons were slaves; and the term freeman, still used in certain Brit. municipalities, of old distinguished those who were not slaves. The statutes of labor still retained a portion of this servitude, laying heavy penalties on workers in various trades who refused to work at a regular fixed remuneration—often, of course, below the market value, otherwise it would not require to be protected by penalties. By the Poor Law Act, too, those who would not work might be veritably enslaved by being compelled to labor in the service of any householder. It may be said, indeed, to have been the last stage of the emancipation of the working-classes from slavery when the Combination Act was repealed 1825. This act, which, after all, was a mild relic of the old laws for coercing workmen, subjected those who, whether verbally or in writing, entered into combinations for keeping up the wages of their labor, or limiting the hours of work, to be punished by imprisonment as criminals. There is no doubt that, in defiance of this act, secret combinations were held, which were more dangerous and cruel than any that have occurred since the repealing act of 1825, which rendered combination itself lawful, but punished any attempts to enforce the views of the combining workmen by violence or intimidation. But in England to-day, under the various Trade-union Acts, employers and employed may lawfully do in combination all that they would be entitled to do as individuals. The organization of trades in Great Britain are now very thorough. Not only are the leading trades almost completely organized, but there is a national body, known as the Trade Union Congress, which unites the principle trade organizations. This Congress is a loose federation without legislative control over the organizations comprising it, and it has held annual meetings of representative delegates since 1868 for the discussion of questions of interest to labor; and has appointed various special committees to attend to certain definite business, usually relating to labor

legislation. In 1899 it organized the General Federation of Trades Unions as an auxiliary body; this federation is under the government of a council of representative delegates and an executive or "management" committee; it attends only to industrial questions, especially to the control and support of strikes. In 1900 the Congress, therefore, organized the Labor Representation Committee, which attends to the securing the election of labor men to Parliament, and includes in its membership the Independent Labor Party and the Fabian Society.

In the United States, the first T.-U. was organized in New York 1803—the 'Journeymen Shipwrights' Soc.,' and the next appears to have been the 'House Carpenters' Soc.' of New York, 1806. New York was also the first state to legalize combinations of workmen, and Penn. the second. By the N. Y. act of 1870, labor-unions are declared lawful, as is also any peaceful combination in a trade or calling to increase or maintain a scale of wages; but if workmen combine to raise their wages by conspiring *to compel other workmen* to conform to rules established by the conspirators for the purpose of regulating the price of labor, they are indictable for conspiracy. The Penn. act of 1872 also declares trade-unions lawful; it provides that laborers, etc., as individuals, or as members of a society, may lawfully refuse to work for any employer when, in their opinion, the wages are inadequate, or the treatment received from employers is brutal or offensive, or when the continued labor of such workmen would be 'contrary to the rules, regulations, or by-laws of any club,' etc., to which the workmen may belong. A printers' union existed in New York 1817, and was incorporated 1818. Thurlow Weed (q.v.) visited Albany to procure its incorporation by the legislature. In his *Autobiography* he writes: 'I remember with what deference I then ventured into the presence of distinguished members of the legislature, and how sharply I was rebuked by two gentlemen, who were quite shocked at the idea of incorporating journeymen mechanics.' In Boston, Philadelphia, and other cities the organization of trade-unions came much later. As early as 1825 the project of a national organization of several trades was mooted, yet the unions continued local till 1852, when the 'National Typographical Union' was founded—later (1869) styled the 'International Typographical Union,' to signify its inclusion of the Canadian craftsmen. Other local unions followed the example of the printers, first the Hatters, 1854; then the Machinists and Blacksmiths, who formed an 'International Union of N. America' 1859; and the same year saw the institution of the 'National Founders' League,' later reorganized as the 'Iron Moulders' International Union of N. America;' and these and other unions of workers in iron not long afterward combined to form the powerful organization known as the 'Amalgamated Assoc. of Iron and Steel Workers of the United States.' The 'Brotherhood of Locomotive Engineers' arose 1864. As early as 1860, 26 trades were organized nationally. Since then, nearly all handicrafts have formed organizations coextensive with the coun-

try. In these unions, whether local or general, the special interests of the several trades alone were regarded as ends; and their common law, so to speak, took no cognizance of questions concerning the welfare of craftsmen or workingmen in general: political questions were ruled out of order; *a fortiori* projects savoring of 'socialism' or 'paternalism in govt.' had no chance of obtaining a hearing in the unions. But in 1860 in the congress of the unions of Machinists and Blacksmiths a resolution was offered and received with some favor, proposing the shortening of daily labor to 8 hours. A convention of representatives of trade-unions, Philadelphia, 1861, Feb. 22, deliberated on the state of the country in view of the then impending civil war. The 'National Labor Union' (union of craftsmen belonging to all trades) was formed 1865 in a convention at which such questions as the 8-hour day, the national currency, the national debt, the public lands, etc., were discussed. But organized labor was not yet ready to combine for promotion of these objects, and the National Labor Union had a brief life. But it is worthy of note that at that convention of workingmen the establishing of a national labor bureau was first publicly advocated. The first fruit of this general organization of the trades was the enactment by congress of the 8-hour labor law, 1868, Jan. 25, by which it was declared that '8 hours shall constitute a day's work for all laborers, workmen, and mechanics who may be employed by or on behalf of the govt. of the United States.' To the National Labor Union succeeded the 'Industrial Brotherhood,' another short-lived organization which came into existence 1874, Apr., at an Industrial Congress, Rochester, N. Y. The Industrial Brotherhood was the first general organization of trades to overstep the limits of skilled crafts and to invite to fellowship 'mechanics and *other laborers*.' The order of the Knights of Labor (see LABOR, KNIGHTS OF) was definitively constituted 1869, Dec. 28. The Knights emphasized the importance of organizing the unskilled laborers, and sought to unite skilled and unskilled in one strong organization; they made the mistake of disregarding too completely the importance of trade lines, and, though for a time a powerful organization, have lost both numbers and influence in recent years, their membership in 1904 being about 40,000. On the other hand the American Federation of Labor, organized in 1881, has grown steadily until it now has a membership of over 2,000,000. It is not a close union of trades, and has little actual control over the unions composing it; its annual meetings, however, serve to unite the leading trade-unions of the country, and to determine the general policies which shall guide their action.

The purpose of the trade-unions is to protect the wage-earners' interests through "collective bargaining," that is by arranging with the employers a scale of wages and hours through the action of the union as an organization, instead of by the "individual bargaining" of each workman with the employer. It is urged by the unionists that the so-called "individual bargain" is really no bargain at all, but the employee's unquestioned acceptance of the em-

ployer's terms; it is said further, that in the event of any depression of trade, the employers invariably attempt to reduce wages; and that when trade improves, they defer as long as possible the restoration of the former rate; and thus the workmen are the first to feel commercial disaster and the last to benefit by better times. Therefore it is claimed that in order to put the workingmen on a basis of equality with the capitalists, combination is an absolute necessity. Naturally wages and hours are not the only things which occupy the unions' attention; they are concerned also with the establishment of just shop rules in regard to minor matters, the regulation of the number of apprentices in the trade, etc. Their methods of assisting and defending the workingmen include keeping registers of men unemployed and of employers wanting men, assisting men from town to town in search of employment, maintaining men in resistance to employers, and organizing and conducting strikes. In regard to strikes it is generally admitted that they are an important factor in trade-union methods; on the other hand the strike is coming to be regarded more and more as the last resort, when all other means have failed to secure the union's objects. It is the newer and weaker organizations with whom strikes are most frequent, the older and stronger unions are often able by their very strength to avoid the necessity of a strike. The statistics of the United States Bureau of Labor show that the majority of strikes are for an increase or against a reduction of wages; other important causes are the reduction of hours and the recognition of the union. Among the largest strikes which have affected the United States are the railroad strike of 1877 against a 10 per cent. reduction in wages, which resulted in much violence, especially around Pittsburgh, and resulting in but trifling gains for the workingmen; the numerous coal strikes, which with the growing strength of the United Mine Workers, resulted in a fairly satisfactory scale in the bituminous fields in 1897, and in a settlement of the more important disputed points in the anthracite fields in 1902, through a commission appointed by the President of the United States; and the Pullman strike of 1894, which begun by the employees of the Pullman Company for higher wages and the settlement of other grievances, was complicated by a sympathetic strike of the American Railway Union, which crippled many of the most important railroads, and resulted in a defeat for the union, though success looked probable for several days. In later years the question of the recognition of the union has become of increasing importance, and this has in many cases involved the question of the "open or closed shop." Theoretically the closed shop means the employment of union men only, the open shop the employment of both union and non-union men; too often practically the open shop means the employment of non-union men to the exclusion of unionists, and with the purpose of destroying the principle of "collective bargaining," and lowering the standard of wages set by the union. In many cases also the question has been raised by the employer's declaring

against the union shop, before the unions themselves had made it a point for controversy. For this reason, and because of the feeling aroused that this would be done by employers wherever possible, the unions have sometimes retaliated by making the "closed shop" an issue in cases where its establishment was not a necessity. In general, however, it is the claim of the trade-unions, supported in this by many of the most noted political economists, that in many trades the union shop is a necessity to enforce the union's scale of wages and hours and to maintain the conditions of employment where they should be, especially in trades where competition is threatened with cheap labor needing little skill or training; and that the unions do not and will not insist upon the closed shop except where it is a necessary means to this end.

The trade-unions of the United States are not, as a rule, in sympathy with the doctrines and aims of the Socialists; there are exceptions, as in the case of the Western Federation of Miners, which is avowedly socialistic, and many of its leaders Socialists. There is very little enthusiasm among them, either, for a separate Labor Party, though various local labor parties have been established by the combined efforts of the trade unions of different cities; these usually have been to meet some special need, and have been short-lived. The American Federation of Labor has, however, a political program which demands among other things, compulsory education laws, a legal working day of not more than eight hours, an employer's liability law, municipal ownership of street cars, water works, and lighting plants, national ownership of telegraphs, telephones, railroads, and mines, and direct legislation. The unions seek to enforce these demands and secure other legislation made necessary by local conditions, by maintaining lobbies at the national and state Capitols, and by taking part in campaigns where necessary to defeat some candidate especially hostile to organized labor, or to elect some one who favors them, and is pledged to obtain or enforce such laws as they demand. But all the reforms which they advocate can be obtained under the present social system, and do not involve their acceptance of Socialist principles nor the destruction of the capitalist system. See COMPETITION; LABOR; FACTORY; FACTORY ACTS; INTERNATIONAL, THE; BOYCOTTING; MACHINERY, POLITICAL ECONOMY OF; TRADE SCHOOL.

TRADITION, n. *tră-dĭsh'ŭn* [F. *tradition*, tradition—from L. *traditĭō* or *traditĭōnem*, a delivering up—from *trado*, I deliver, I transmit—from *trans*, across; *do*, I give]: the transmission of events, doctrines, opinions, rites, etc., from father to son, through successive generations, by word of mouth: that which is so handed down (see RULE OF FAITH: INFALLIBILITY): old custom: PLU. things or deeds preserved only in the memories of successive generations, and not committed to writing. TRADI'TIONAL, a. *-ăl*, transmitted by word of mouth only; received by tradition; in *OE.*, observant of traditions. TRADI'TIONALLY, ad. *-ăl-lĭ*. TRADI'TIONARY, a. *-ĕr-ĭ*, derived from tradition; transmitted

from age to age without writing. TRADI'TIONARY, n., or TRADI'TIONIST, n. *-ĭst*, one who acknowledges the authority of tradition. TRADI'TIONARILY, ad. *-ĕr-ĭ-lĭ*. TRADITIVE, a. *trăd'ĭ-tĭv*, transmitted or transmissible from age to age by oral communication; traditional.

TRADITOR, n. *trăd'ĭ-tŏr* [L, *traditor*, a traitor—from *tradĕrĕ*, to give up—from *trans*, across; *do*, I give]: *literally*, a traitor; hence, among the *early Christians*, a name of infamy applied to those who delivered their Scriptures, etc., to their persecutors to save their lives.

TRADUCE, v. *trā-dūs'* [L. *traducĕrĕ*, to lead across, to disgrace—from *trans*, across; *duco*, I lead or bring]: to misrepresent and abuse; to calumniate; to defame; in *OE.*, to propagate; to translate, as from a foreign tongue; to display; to lead astray. TRADU'CIAN, *-dū'shan*, a believer in traducianism. TRADU'CIANISM, the theory or doctrine that the soul as well as the body is propagated and not created. The origin of this theory is ascribed to Tertullian (q.v.), who explains and defends it in his book *On the Soul*, written after he had lapsed into the Montanist heresy. In opposition to others who had held the theory of the pre-existence of souls—of which pre-existing souls one is divinely infused, or, by some natural affinity, is attracted into each fetus so soon as it has been formed by generation in the procreation of man—Tertullian taught that souls are propagated by souls as bodies by bodies, and by the same or a simultaneous process. In another place he describes this origin of soul from soul as generation, and even of a class analogous to corporeal generation; and this more gross and material exposition of the theory of T. is sometimes called *Generationism*, which, however, is commonly classed as a totally distinct theory. A third hypothesis as to the origin of the soul suggested that, in the propagation of the human species, whenever a human body is formed by generation, the soul which is to animate that body is created, and by divine power infused into it. This theory is called *Creationism* (q.v.). Creationism is maintained by the argument that it accords with the scriptural distinction in origin between man's body and soul—the body being referred to the formation of materials from the earth, the soul being referred to the direct inbreathing of life from God: also by the argument that it accords with the indivisibility of the soul as a spiritual essence, while T. requires the division of a soul in the act of generating out of itself another soul. Inasmuch as T. is maintained by the argument that it is necessary to account for the transmission of a sinful nature from Adam to the whole race as his posterity (i.e., by community of essence), the advocates of creationism reply that the Lord Jesus, as sharing with man in the same community of essence, would thereby be a sharer in the human sinfulness of nature, which in fact he was not.—We may be content to say of this mystery, with St. Augustine, 'How the soul derives its being, I do not know.' It is possible that there may be a truth in both theories; for it is at least conceivable that the *body* is generated corporeally (traducian-

ism), while the *spirit* or life-principle is given directly from God (creationism); whereupon by the instant and continuous close interaction of these two constituent elements of humanity, the *soul* arises as the personality of the individual man—recipient at once of the Divine life from God through the man's spirit, and of various human characters and tendencies by heritage from parentage through the body.—See ANTHROPOLOGY: DESCENT OF MAN: HEREDITY: ETC.—The discussion of these theories in the 4th and 5th c. was much promoted by the controversies on Manichæism: see MANICHEAN.—TRADU'CING, imp. TRADUCED', pp. *-dūst'*. TRADUCE'MENT, n. censure; obloquy. TRADU'CINGLY, ad. *-lĭ*. TRADU'CER, n. *-sĕr*, one who traduces. TRADU'CENT, n. *-sĕnt*, slandering. TRADUC'TION, n. *-dŭk'shŭn*, in *OE.*, derivation from one of the same kind; propagation; conveyance. TRADUC'TIVE, a. *-dŭk'tĭv*, derivable; that may be deduced.—SYN. of 'traduce': to vilify; defame; disparage; depreciate; decry; slander; calumniate; detract; censure.

TRAFALGAR, *tra-fâl'gĕr*, or *trâ-fâl-gâr'*, CAPE: low promontory on the s. coast of Spain, about 29 m. w.n.w. of Tarifa (q.v.), on the Straits of Gibraltar. It is memorable for the great naval victory (1805, Oct. 21) by the British fleet under Nelson, over the combined fleets of France and Spain under the French commander Villeneuve and two Spanish admirals. The British force consisted of 27 sail of the line, 4 frigates, 1 schooner, and 1 cutter; the force of the French and Spaniards united amounted to 33 sail of the line, 5 frigates, and 2 brigs. The largest of the French and Spanish ships carried 30 guns more than the largest of the British ships. The engagement resulting in a splendid victory for the British (who captured 19 ships) was gained at the cost of the life of the greatest of English admirals: see NELSON.

TRAFFIC, n. *trăf'fĭk* [F. *trafiquer*, to traffic—said to be derived from L. *trans*, across, and *vices*, exchange: more probably of Celtic origin; Lang. *trâfi*, disturbance, trouble W. *trafu*, to stir, to agitate]: interchange of goods, etc., between countries, communities, or individuals; commerce trade; goods or persons passing to and fro along a road railway, or canal: V. to buy and sell goods; to trade; to carry on commerce; to trade meanly or mercenarily. TRAF'FICKING, imp.: ADJ. bargaining; dealing; jobbing: N. the act of buying and selling goods. TRAF'FICKED, pp. *-fĭkt*. TRAF'FICKER, n. *-fĭk-ĕr*, one who trafficks; a trader; one who deals meanly or mercenarily.

TRAGACANTH, n. *trăg'ă-kănth* [L. *tragacan'thum*—from Gr. *tragos*, a goat; *akan'tha*, a thorn]: the concrete juice or gum of several species of shrubby or herbaceous plants, usually in the form of white or yellowish semi-transparent flakes, of great toughness; the *Astrag'ălus vĕrus*, ord. *Legumĭnōsæ*, sub-ord. *Papilĭonācĕæ*, found in Asia Minor and Persia, seems to be the chief source of the European tragacanth (see BASSORINE: GUM).

TRAGEDY, n. *trăj'ĕ-dĭ* [F. *tragédie*, a tragedy—from L. *tragœdĭa;* Gr. *tragōdĭa*, a tragedy—from *tragos*, a goat; *ōdē*, a song: so called because the actors of the early tragedies were dressed in goat-skins, or because a goat was the prize in the tragic contests]: a dramatic poem representing an event, or a series of events, in the life of an individual, generally having a fatal issue, and meant to impress on the mind some great moral truth (see DRAMA); the muse of tragedy: any event in which human lives are lost by murderous violence; a fatal and mournful event. TRAGEDIAN, n. *tră-jē'dĭ-ăn*, a writer or an actor of tragedy. TRAGE'DIENNE', n. *-dĭ-ĕn'* or *tră-zhā'-dĭ-ĕn'* [F. *tragédienne*]: female actor of tragedy. TRAGIC, a. *trăj'ĭk*, or TRAG'ICAL, a. *-ĭ-kăl* [F. *tragique*—from L. *tragĭcus;* Gr. *tragĭkos*, tragic]: of or relating to or of the nature of tragedy; expressive of or resembling tragedy; fatal; calamitous. TRAG'ICALLY, ad. *-lĭ*. TRAG'ICALNESS, n. *-nĕs*, the quality of being tragical; mournfulness. TRAGI-COMEDY, n. *trăj'ĭ-kŏm'ĕ-dĭ*, a dramatic piece having serious and comic scenes blended, and the issue not fatal or unhappy. TRAG'I-COM'IC or -COM'ICAL, pert. to tragi-comedy. TRAG'I-COM'ICALLY, ad. *-lĭ*.

TRAGICUS. See under TRAGUS.

TRAGOPAN, n. *trăg'ō-păn* [Gr. *tragos*, a goat]: oriental bird of the *Phasianidæ* or pheasant family, having the head crested, but naked on the cheeks and around the eyes; a horn-like caruncle projecting backward from behind each eye, and a loose wattle, capable of being inflated, hanging beneath the bill. The tarsi are armed with a blunt spur in the male, unarmed in the female. The tragopan is a native of Asia, and is a bird of beautiful plumage, somewhat resembling a pheasant. The species *Ceriornis satyrus* has been called the *Horned Pheasant:* it inhabits the higher parts of the Himalaya, Tibet, and some mountainous provinces of China. It is thought that the tragopan might profitably be domesticated in Europe and America.

TRAGUS, n. *trā'gŭs* [Gr. *tragos*, a goat]: in *anat.*, the small cartilaginous eminence at the entrance of the external ear, often beset with hair like the beard of a goat, hence the name. TRAGICUS, n. *trăj'ĭ-kŭs*, a short, flattened band of vertical muscular fibres on the outer surface of the tragus.

TRAHERNE. *trā-hėrn'*, THOMAS: English author: b. about 1636; d. Teddington, Middlesex, 1674. He was educated at Brasenose College, Oxford, took orders, became rector of Credenhill, Herefordshire, 1657, and subsequently chaplain to Sir Orlando Bridgman at Teddington. His published writings were *Roman Forgeries*, a polemical tract; and a treatise on *Christian Ethicks*. A prose work, *Centuries of Meditations*, and a collection of poems, were left in manuscript. The poems, discovered in a bookstall about 1897, were at first attributed by Grosart to Vaughan, but were claimed by Bertram Dobell to be

Traherne's, and edited by him for the press. They have been described as a notable 'find,' and compared to the work of Vaughan and Herbert.

TRAIL, n. *trāl* [Sp. *trailla,* a drag for levelling ground: Dut. *treylen,* to drag a vessel by a rope: mid. L. *tragŭla,* a sledge—from *trahĕrĕ,* to draw: comp. Gael. *triall,* a journey]: anything drawn to length or behind, as the train of a gown; that part of the stock of a gun-carriage which rests on the ground when the piece is unlimbered; the marks or scent left by any animal by which it may be pursued; the track followed by a hunter: V. to hunt by tracking; to draw along the ground or behind; to draw; to drag; to be drawn out in length. TRAIL'ING, imp.: ADJ. drawing along the ground; floating, dragging, or waving. TRAILING-WHEELS, the back pair of driving-wheels in a four-coupled wheel arrangement, or a small pair of wheels placed behind the main driving-wheels where only one pair of driving-wheels is employed. In either case they are located far enough back of the main driving-wheels to provide the necessary room for the fire-box between the two axles. TRAILED, pp. *trāld.* TRAIL'ER, n. *-ėr,* one who or that which trails or requires support, as a plant. TRAIL-NET, a drag-net.

T-RAIL, n. *tē-rāl:* railway rail in the form of a T, having two flanges above, forcing a wide tread for the rolling stock.

TRAIL, n. *trāl* [contr. of ENTRAIL]: entrails of certain birds, as of a snipe or woodcock.

TRAILL, *trāl,* CATHERINE PARR STRICKLAND: Canadian writer: sister of Agnes Strickland; b. London 1802, Jan. 9; d. Lakefield, Ont., 1899, Aug. 29. She was married in 1832 to Capt. Thomas Traill, with whom she removed to Canada in 1833, and made her home for the rest of her life at Lakefield, Ont. Among her works are: *The Backwoods of Canada* (1835); *Canadian Crusoes* (1852); *Ramblings in the Canadian Forests* (1854); *Afar in the Forest* (1869); *Studies of Plant Life* (1884); *Pearls and Pebbles* (1895).

TRAILL, HENRY DUFF: English journalist and man of letters: b. Blackheath, Kent., 1842, Aug. 14; d. London 1900, Feb. 21. He was graduated at St. John's, Oxford, 1864, called to the bar in 1868, but soon took to literature. He was connected with the *Pall Mall Gazette* (1873-80), the *St. James' Gazette* (1880-2), *Telegraph* (1882-96), and the *Saturday Review* (1883-94). From 1889 to 1891 he was editor of the *Observer;* from 1898 to 1900 of *Literature.* Among his publications are: *Lives* of Strafford (a very original work with a new view) (1889), William III. (1888), Sterne (1882), Coleridge (1884), and others; also *Central Government* (1881); *Recaptured Rhymes* (1882); *The New Lucian* (1884, revised and enlarged 1900), his best work; *Saturday Songs* (1890), satirical verse; *From Cairo to the*

Soudan Frontier (1896); and *The New Fiction, and Other Essays on Literary Subjects* (1897).

TRAIN, Elizabeth Phipps: American novelist and translator: b. Dorchester, Mass., 1856, Sep. 1. She was educated at Wells College, Aurora, N. Y., and her first literary work consisted entirely of translations from the French. They include: *The Apostate* (1889); *Recollections of the Court of the Tuileries* (1891); etc. Her first original publication was *Dr. Lamar* (1891), and she has since written: *Autobiography of a Professional Beauty* (1895); *A Social Highwayman* (1895); *Queen of Hearts* (1897); and other works.

TRAIN, George Francis: American financier and author: b. Boston 1829, Mar. 24; d. New York 1904, Jan. 18. In 1850 he was put in charge of the Liverpool branch of an American business house, and three years later was admitted to partnership. Another branch was established in Melbourne, Australia, in 1853, under his supervision, and during the three years of his stay there he introduced a sailing-ship service between Boston and Australia. In 1858 he interested English capital in the building of the Atlantic and Great Western railway; and afterward undertook street-railway enterprises in England and other European countries, but his plans, through opposition and otherwise, were frustrated. His next railroad enterprise was the building of the Union Pacific railway, ground for which was broken at Omaha 1863, Dec. 2, and the connection that linked the eastern and western extremities completed 1869, May 10. He made a tour of the world in 80 days, arriving in Marseilles, France, 1870, Oct. 20, where he organized the Commune, was arrested and imprisoned for 13 days at Lyons. In 1872 he became an independent candidate for president of the United States. He was a man of eccentric habits and extravagant speech, and in November, 1872, was arrested on the charge of having published obscene literature. The passages objected to were wholly quotations from the Bible. Mr. Train was discharged from custody after having been adjudged insane by legal decision. His later years were spent in New York, where he adopted the habit of speaking only to children. He called himself *Citizen of the World,* and while his title to property valued at $30,000,000 at Omaha, Neb., remained in litigation he affected a simple style of living, and spent his last years at a cheap hotel, where he died. Among his publications are: *An American Merchant in Europe, Asia and Australia* (1851); *Young America Abroad* (1857); *Young America in Wall Street* (1858); *Young America on Slavery* (1860); *Championship of Women* (1868); and *My Life in Many States and in Foreign Lands.*

TRAIN, n. *trān* [OF. *trahin;* F. *train,* a train—from mid. L. *trahinārĕ,* to drag—from L. *trahĕrĕ,* to draw]: that which is drawn along behind; the long part of a

dress behind; the tail of a bird; the after part of a gun-carriage; a number of followers or attendants; a retinue; a regular method; a course; a series or succession, as of ideas; a state of procedure; orderly company; a procession; a line of gunpowder laid to fire a charge; on a *railway,* a number of carriages or cars drawn by an engine; in *OE.,* a stratagem; a trap: V. to draw; to form by instruction and practice; to educate and bring up; to break or tame for use; to form to any practice by exercise; to cause to assume a proper shape in growth, as a tree; to point a large gun in a particular direction; in *OE.,* to draw along; to invite; to allure; entice; to draw by artifice or stratagem; to draw from act to act by inducements. TRAIN'ING, imp. teaching and forming by practice: N. process of teaching or forming by practice; operation or art of forming young trees to a wall or espalier; preparation of men for athletic exercises, or horses for running a race (see below); disciplining of troops. TRAINED, pp. *trānd:* ADJ. having a train; brought up or reared by practice. TRAIN'ABLE, a. *-ă-bl,* capable of being trained. TRAIN'ER, n. *-ėr,* one who trains—generally restricted to one who prepares another for the performance of feats requiring certain physical qualities, as a horse for racing, or a pugilist for a prize-fight. To TRAIN UP, to educate by teaching and practice. TRAIN OF ARTILLERY, a number of large guns, mortars, etc. TRAIN-BAND (properly, trained band), formerly, a band or company of militia. The train-bands of London were chiefly composed of apprentices; and their unruly doings formed the subject for many facetious plays and tales. In the civil wars the train-bands sided with the parliament; and Charles II. restored the militia on its old local footing. TRAIN-BEARER, one who holds up the train of a distinguished person. TRAINING SCHOOL, a school in which pupils are trained for a particular pursuit or object; in Britain, school in which teachers are educated; a training college (see NORMAL SCHOOL). RAILWAY TRAIN, a line of carriages or trucks, or both, drawn by an engine and tender on a railway. DOWN-TRAIN, in *Britain,* a train which runs from the capital to the provinces. UP-TRAIN, in *Britain,* a train which runs from the provinces to the capital. THROUGH-TRAIN, a train which runs from terminus to terminus, or from one system on to another without change of carriages.

TRAIN BANDS: a body of citizens partaking of the nature of both militia and volunteers, instituted by James I. and dissolved by Charles II. James I. organized train bands in 1604 on the abolition of the fyrd but they lacked discipline and efficiency. They sided with the Parlementarians during the Civil War; after the Restoration command of these bands was assigned to the king. The term was afterward applied to the London militia, from which the 3rd regiment of the line originated, and in which the renowned John Gilpin was a captain.

TRAIN'ING, in an Athletic and Sporting Sense: preparation for athletic exercises or for some special line of bodily activity—implying the acquisition of vigorous health. The term is applied in reference to men, horses, and dogs. A person is said to be trained 'in condition,' when he has by certain processes rendered his frame as fit as it is possible for it to be, for performing some feat of strength or endurance—e.g., a trial of speed, a rowing match, a wrestling match, or any other prolonged exertion. For such purposes, the T. is often long and severe. It being necessary to divest the muscles of every particle of fatty tissue which can possibly be spared without direct injury to the health, it often happens that many pounds of flesh must be lost; and severe and continued exertion is necessary—the body being wrapped in thick suits of flannels, denominated 'sweaters.' Rigid abstinence also is requisite in certain departments of diet; e.g., no matter how thirsty the person in training may be, after perhaps ten miles' rapid walking in a triple suit of sweaters, he is allowed to drink only very sparingly, for though he may have taken off pounds of flesh by profuse perspiration, one glass of ale might undo the whole effect. Great attention to diet is necessary. Indeed, much of the system has been aptly expressed as consisting in the resolute performance of the three cardinal virtues—temperance, soberness, and chastity.—Almost the same course is pursued in training animals; and whether for hunting or racing, horses and dogs have to submit to a course of T. to bring them into 'condition.' The Turkish bath, as a means of procuring the necessary reduction of flesh without excessive labor, has been found an efficient ally. Out of 'condition,' the muscles are flabby, confused and coated with fat; the skin dead and lifeless; the eye dull and heavy; the lungs laboring, and the movements slow. In 'condition,' the muscles stand out hard, clear and defined; the tendons show like cords; the skin is clear, and ruddy; the eye bright; the lungs play with unrestrained freedom; and the whole frame is endued with vigor and perfect activity. See Maclaren's *Training in Theory and Practice.*

TRAIN-OIL, n. *trān'oyl* [Dan. and Sw. *tran;* Ger. *thran;* Dut. *traan,* train-oil]: an oil obtained from the fat or blubber of the whale.

TRAIT, n. *trāt* or *trā* [F. *trait,* feature—from L. *tractus,* pp. of *trahĕrĕ,* to draw]: a line; a stroke or touch; a feature, or peculiar feature, as of character.

TRAITOR, n. *trā'tĕr* [OF. *traïtor;* F. *traître,* a traitor—from L. *tradĭtor,* a traitor; *tradĕrĕ,* to betray—from *trans,* across; *do,* I give]: one who abandons a cause which he was bound to defend, as of his sovereign or country; one guilty of treason; one who betrays his trust. TRAI'TORLY, a. *-lĭ,* in *OE.,* treacherous; perfidious. TRAI'TOROUS, a. *-ŭs,* guilty of treason: treacherous; perfidious. TRAI'TOROUSLY, ad. *-lĭ.* TRAI'TOROUSNESS, n. *-nĕs,* the quality of being traitorous; treachery; also TRAI'TORISM, n. *-ĭzm.* TRAI'TRESS, n. *-trĕs,* a woman who betrays her country or her trust.

TRAJAN, *trā'jan* (MARCUS ULPIUS TRAJANUS, *mär'kŭs ŭl'pĭ-ŭs tra-jā'nŭs*): fourteenth Roman emperor: prob. A.D. 53–117, July (reigned 98–117); b. Italica (Alcala), near Seville (Spain); of a family probably of Roman origin. He was early trained to arms, becoming a prominently successful leader in the Parthian and German campaigns, during the reigns of Titus and Domitian. He was rewarded for his soldierly services by promotion to the offices of pretor and consul (91), and was ultimately adopted (97) by Nerva (q.v.) as his colleague and successor. T. became sole ruler 98, Jan., and celebrated his accession by the largess (somewhat less than usual) to the soldiers, but extended by him to the Roman citizens also and their children; and he made large provision out of the imperial treasury for rearing the children of poor freemen in Rome and other Italian towns, with the view of encouraging increase of population. In 101, Rome for the first time beheld its emperor leading forth his legions in person on a career of conquest, when T. set out on his first campaign against the Dacians who had exacted tribute from Rome since Domitian's time. The struggle was long and destructive: the emperor's opponents were valiant warriors, and headed by an able leader, their monarch, Decebalus; but the Romans at last gained decisive superiority; and in a subsequent campaign (104–5) completely subdued their opponents, whose country thenceforth became the Roman province of Dacia, and was secured by partial colonization. This conquest, the first since the death of Augustus, was celebrated, on T.'s return to Rome, by a superb triumph, and by games on a most extensive scale, which continued for four months. In the arena 10,000 gladiators contended, and 11,000 beasts were killed. Thirst for dominion again impelled T. to the east in 106. Landing in Syria, he marched n., received on his way the submission of numerous princes, possessed himself of Armenia, which he made a province of his empire, and hugely gratified the Roman senate with long lists of monarchs, never before heard of, who had bowed to their sway. The record of the events of the next seven years of T.'s reign is extremely defective, the few notices in Dion Cassius and others being insufficient for a consecutive narrative. In 115, he again set out from Syria, directing his march against the degenerate Parthian empire; took Ctesiphon almost without a struggle; and descending the Tigris, and subduing the tribes on both banks, became the first and only Roman general who navigated the Persian Gulf. On his return, he found that, like the bent reed which recovers its position when relieved from pressure, the peoples of Mesopotamia, n. Syria, and Arabia required to be again and more thoroughly subdued. This being done, and Parthia again conquered, T., sinking under a combination of dropsy and paralysis, which had long afflicted him, attempted to reach Italy, but was overtaken by death at Selinus, in Cilicia. Though most of T.'s reign was spent in gratification of his warlike ambition, the internal administration was careful, thorough, and sensible; the administration of justice was vigorous and impartial;

that of finance was equally acceptable; informers (*delatores*) were severely punished, and peculating governors of provinces rigorously prosecuted. The improvement and beautifying of Rome—favorite occupation of the emperors—was carried on: the empire was traversed in all directions by new military routes, canals and bridges were constructed, new towns built, the Via Appia was restored, the Pontine Marshes partially drained, the magnificent 'Forum Trajani' erected, and the harbor of Centum Cellæ (Civita Vecchia) constructed. T. was one of the great historical road-makers.—Even if there were not abundant evidence of the sincere desire of T. to increase the comfort and happiness of his subjects, the customary wish formally uttered on the occasion of an emperor's accession, that he might be 'happier than Augustus, better than Trajan' (*Augusto felicior, Trajano melior*), would suffice for proof. In his personal character, T., a born soldier, was singularly simple, sincere, frank, and courageous. He, as also his admirable wife Plotina, detested pomp. He returned, almost ostentatiously, to the old republican simplicity in his own habits and in his imperial procedure—making himself freely accessible to his subjects and to his soldiers. He made his soldiers his comrades; yet it was known that no military detail escaped the emperor's eye, and that the least violation of discipline would meet unwavering justice. Pliny praises T. as the great military law-giver and the founder of discipline in the Roman army. His popularity with his soldiers and with the citizens was unbounded.—During T.'s reign, there was a mild persecution of the Christians; and taking into account that T. naturally shared the general belief that Christianity was a novel and perilous species of fanaticism, his conduct toward it may perhaps be almost deemed moderation.

TRA'JAN'S COLUMN: celebrated column at Rome, reared A.D. 114 by the Roman senate and people, in honor of Emperor Trajan. It is considered not only the greatest work of its architect, Apollodorus, but one of the noblest structures of its kind ever erected. The pedestal is covered with bas-reliefs of warlike instruments, shields, and helmets; and a very remarkable series of bas-reliefs, forming a spiral round the shaft, exhibits a continuous history of the military achievements of Trajan. These are in excellent preservation, and, independently of their beauty as works of art, they are invaluable records of ancient costume. A spiral staircase in the interior of the column leads to its summit. The height of the entire column is 132 ft. It still stands erect in all its ancient beauty amid the ruins of Trajan's forum. The summit was originally crowned by a colossal statue of the emperor, which has been incongruously replaced by one of the apostle Peter.

TRA'JAN'S WALL: line of fortifications stretching across the Dobrudscha from Czernavoda, where the Danube bends N., to a point on the Black Sea coast near Kustendji. It consists of a double, in some places triple, line of ramparts of earth, 8¾ to 11 ft. in height on the average (occasionally of 19½ ft.), bounded along its N. side by a

valley, which, being generally marshy, and abounding in small lakes and pools, serves admirably the purpose of a fosse. This valley was long erroneously supposed to have been at one time the channel by which the Danube emptied; and a scheme for utilizing it by construction of a canal to provide a more commodious water-communication with the Black Sea, instead of the long and troublesome navigation by the Sulina mouth, has been frequently mooted, and is undoubtedly practicable; but the cost has hitherto been a bar to its execution. During the war of 1854 Trajan's Wall became an important line of defense on the invasion of the Dobrudscha by the Russians; and the invaders were twice defeated in attempts to pass it—at Kostelli (Apr. 10) and Czernavoda (Apr. 20-22).

TRAJECT, v. *tră-jĕkt'* [L. *trajectus,* thrown over or across—from *trans,* over; *jactus,* pp. of *jacĕrĕ,* to throw]: to throw or cast through: N. *trăj'ĕkt,* in *OE.,* a ferry; passage for water-carriage. TRAJECT'ING, imp. TRAJECT'ED, pp. TRAJEC'TION, n. *-jĕk'shŭn,* a throwing or casting over; transportation. TRAJEC'TIVE, a. *-tĭv,* in *gram.,* applied to a verb which governs the dative. TRAJEC'TORY, n. *-tĕr-ĭ,* in *math.,* the curve or path which a body describes when projected into space and continuously acted on by constant or varying forces: thus, the trajectory of a body projected obliquely for a little distance above the earth is approximately a parabola (it would be accurately so were space void and the force of gravity of the earth constant); and the trajectories of the planets are approximately ellipses (see PROJECTILES, THEORY OF). A trajectory in mathematics is any plane curve which cuts at a constant angle a series of plane curves.

TRALEE, *tra-lē':* seaport and borough of Ireland, chief town of the county Kerry; on the river Lee, about a mile from the point at which it enters the sea; 162 m. w.s.w. from Dublin. The origin of Tralee was due to the building of a castle, and the foundation of a Dominican convent by the Geraldine family, 1213; and somewhat later a considerable house of the order of Templars was established. The town is well built and has many public buildings. There is large traffic in grain and agricultural produce; annual exports amounting to £200,000, imports to about £150,000. There is a ship-canal, by which vessels discharge their cargoes close to the town. Pop. (1901) 9,867.

TRALL, *trawl,* RUSSELL THACHER: physician: 1812, Aug. 5—1877, Sep. 23; b. Vernon, Conn. He studied medicine, and 1840 began its practice in New York, but soon substituted a water-cure treatment for that by drugs, and 1843 opened an establishment for this treatment. In 1853 he founded the New York Hygeio-Therapeutic College, a medical school for men and women, subsequently removed to Florence, N. J. He was the

editor of the *Hydropathic Review,* and author of many works advancing his views on this subject.

TRALUCENT, TRALUCENCY: OE. forms of TRANSLUCENT, TRANSLUCENCY.

TRAM, n. *trăm* [prov. Eng. *tram,* a kind of coal-wagon: Low Ger. *traam,* the handle of a wheelbarrow: OHG. *tram,* a beam]: the shaft of a cart, wheelbarrow, or the like; a coal-wagon; one of the rails or tracks of a tram-road; *familiarly,* a tramway-car. TRAM'ROAD or -WAY, a road prepared for easy transit of carriages or wagons by forming wheel-tracks of smooth beams of wood, blocks of stone, or plates of iron (the earliest form of railway). Also, grooved iron rails laid in a public street or road, in which the flanged wheels of tramway-cars, called in the United States street-cars, may run smoothly; a street railway: this form of railway originated in the United States.

TRAM, n. *trăm* [L. *trama,* weft]: double silk thread in which two or more singles are twisted together in a direction contrary to the twist of the singles—used only as weft. See SILK.

TRAMA, n. *trā'mă* [L. *trāma,* the woof or filling of a web]: in *bot.,* the central tissue of the lamellæ of gill-bearing fungi.

TRAMMEL, n. *trăm'mĕl* [It. *tramaglio;* Sp. *trasmallo;* F. *tramail,* a fishing-net of two or three layers—from L. *trans,* through, or more probably *tres,* three; *macŭla,* the mesh of a net]: a kind of long net, called a Trammel-net (q.v.); a shackle, especially one of a kind used in teaching horses to amble; anything that hampers or confines; an impediment; an instrument for drawing circles, curves, and ovals: V. to confine or restrain; to hamper; to shackle. TRAM'MELLING, imp. TRAMMELLING-OFF, the measuring of important dimensions, lengths and centres with trammels. In shopwork, it is the only method recognized as correct, rule measurement being inadmissible. TRAM'MELLED, pp. *-mĕld.*

TRAM'MEL-NET: kind of net resembling the drift-net used in the Herring-fishery (q.v.), but anchored and buoyed at each end, the back-rope supported by small cork-floats, and the foot-rope kept close to the ground by weights. The length varies from 60 to 900 ft. A variety of trammel-net, used chiefly in w. England and in Guernsey, consists of three long nets fastened together at top, bottom, and ends; called in parts of Cornwall a *tumbling-net.*

TRAMONTANA, n. *trâ-mŏn-tâ'na* [It.]: a common name given to the north wind in the Mediterranean.—The name is also applied to a peculiar cold and blighting wind in the Archipelago.

TRAMONTANE, a. *tră'mŏn'tān* or *trăm'ŏn-tān* [It. *tramontano,* beyond the mountains—from L. *trans,* beyond; *mons* or *montem,* a mountain]: lying or being be-

yond the mountains—that is, the Alps—originally used by the Italians; hence, foreign; barbarous: N. one living beyond the mountains.

TRAMP, v. *trămp* [nasalized form of Ger. *trapp, trapp,* representing the sound of the footfall: Low Ger. and Ger. *trampen, trampeln,* to stamp: Dut. *trappen;* Sw. *trampa,* to trample]: to tread under foot; to travel over on foot; to wander about on foot: N. the sound of walking, as the *tramp* of feet; a walk or journey; a stroller; a workman of the lower class, journeying on foot from place to place in search of employment; a vagrant; a beggar (see VAGRANTS; BEGGAR; POOR, THE). TRAMP'ING, imp. TRAMPED, pp. *trămpt.* TRAMP'ER, n. *-ėr,* one who tramps; a vagrant. TRAMPLE, v. *trămp'l,* to tread under foot; to tread down; to treat with contempt and insult; to tread with force and rapidity: N. a treading under foot with contempt. TRAMP'LING, imp. *-lĭng:* ADJ. moving regularly and more or less loudly. TRAMPLED, pp. *trămp'ld,* trodden under foot. TRAMP'LER, n. *-lėr,* one who tramples.

TRAM-ROAD or -WAY. See under TRAM.

TRANCE [from L. *transitus,* passed over]: a term used variously and vaguely to designate such modifications of consciousness or subconscious states as ecstasy, lethargy, mediumship, hypnosis, extreme terror, alcoholism, epilepsy, alterations of personality, visions, catalepsy, and many other more or less automatic states. Suppression of consciousness of the environment, limited movement, and lowered action of the vital organs are the most general characteristics. Some forms are marked by pronounced dream states, usually regarded as revelations. A common means of expression is automatic writing: V. to entrance; to charm. TRAN'CING, imp. TRANCED, pp. *trănst,* being or lying in a trance. TRANCEDLY, ad. *trăns'ĕd-lĭ,* in the manner of one in a trance.—*Trance,* or 'morbid sleep,' differs from natural repose in duration; in profound insensibility to external impressions; in occurring after excitement and the exaltation of certain instincts, chiefly the religious and amative, rather than after fatigue or exhaustion; and in being the concomitant or symptom of diseases of the nervous system. The attitude, aspect, lowered respiration, and circulation of the entranced resemble those of the sleeper. But there are many exceptions to this observation. A girl who remained dormant 13 years, though she grew from a child to a woman in that time, was corpse-like in appearance, had locked-jaw, and there was almost total suspension of the signs of life. But while a person cannot be roused from this condition by the most powerful stimulants, by an electric shock, or even, it is affirmed, by a surgical operation, thought or dream goes on uninterruptedly, and is more continuous and coherent in character than in ordinary sleep. So connected and real do these visions appear to the ecstatic that they are generally accepted as true events, revelations, or impressions, received dur-

ing a brief visit to another world. Trance has occurred epidemically during periods of great religious fervor or of superstition; and whole classes of persons are described as having preached while asleep, in the insurrection of the Cevennes. A similar phenomenon was observed 1865 in those affected by hysteromania at Morzine, in Savoy. Trance has been divided, according to the intensity of the symptoms, into (1) *Death-trance,* where neither the heart nor lungs act; where the temperature of the body falls; where no sustenance is taken, and the inner dream-life is the only vestige of vitality. Engelbrecht, who was subject to trance, wrote a book descriptive of this inner life during which he believed himself to be transported to supernatural, if not to celestial, regions. (2) *Trance-coma,* where the breathing and action of the heart are feeble, but perceptible; the joints flexible; but where the external senses are not awake, and where the patient cannot be roused. (3) *Trance-sleep,* where, except in the insensibility to external stimuli, and in the length of the suspension of volition, little abnormal is noticed. See SLEEP; CATALEPSY; HYPNOTISM.

TRANI, *trâ'nē:* maritime city of s. Italy, in the province Terra di Bari; 25 m. n.w. of Bari. It is surrounded by a wall with towers and moats, and entered by three gates. Trani is an archbishop's see, and has a handsome cathedral, convents, a court of appeal, a theatre, and a strong castle. The streets are wide, well built, and paved with flag-stones. There is a handsome square. There is considerable trade in oil, wine, corn, and cotton, which last is also manufactured here.

Trani comes into notice first when it submitted to the Normans 1053: it was then the chief town of a vast county, and was an important harbor in the time of the Crusades. Under the kingdom of Italy it has again begun to prosper, and promises to become an emporium of the commerce of the Levant, as in the middle ages. Pop. 25,173.

TRANK, n. *trăngk* [etym. doubt.]: in *glove-mak.,* an oblong piece from which the shape of the glove is cut on a knife in a press.

TRANNEL, n. *trăn'nĕl:* a treenail. See under TREE.

TRANQUEBAR, *trâng-kwē-bâr'* (corruption of *Tallangambadi*): seaport town on the e. coast of British India, 155 m. s. of Madras. It stands on a small bay, and is backed by a well-wooded and cultivated country; is a healthful station, much cooler than Madras, and has therefore been made a convalescent depot. The town is surrounded by walls with bastions, and is further protected by the fort of Dansborg. The territory of Tranquebar has 15 sq.m.; and produces rice, the cocoanut and other palms, the mango, and a variety of fruits. The town has much declined from its former commercial importance. The territory belonged in the 17th century

to the Danes, was taken by the British 1807, restored 7 years later, but finally passed by purchase into the hands of the British 1845. Pop. of town about 25,000.

TRANQUIL, a. *trăn'kwĭl* [F. *tranquille*—from L. *tranquillus*, calm, serene: It. *tranquillo*]: free from strife or agitation; calm; peaceful; quiet; undisturbed. TRAN'QUILLY, ad. *-lĭ*. TRANQUILLITY, n. *trăn-kwĭl'lĭ-tĭ*, freedom from disturbance or agitation; a calm state; quietness. TRANQUILLIZE, v. *trăn'kwĭl-īz*, to quiet; to calm or soothe; to allay agitation. TRAN'QUILLIZING, imp. TRAN'QUILLIZED, pp. *-īzd*. TRAN'QUILLIZINGLY, ad. *-zĭng-lĭ*. TRAN'QUILLIZER, n. *-ī-zėr*, one who or that which transquillizes. TRAN'QUILLIZA'TION, n. *-zā'shŭn*, the act of soothing or state of being soothed or calm.—SYN. of 'tranquillize': to calm; soothe; still; compose; appease; quiet; pacify.

TRANS-, *trăns:* a Latin prefix which, with its form TRA, signifies across; over; beyond; through; completely; from one to another; complete change, as *Trans*atlantic, *trans*fuse, *trans*mute, etc.

TRANSACT, v. *trăns-ăkt'* [L. *transactus*, carried through, settled—from *trans*, through; *actus*, pp. of *agĕrĕ*, to drive]: to carry through; to complete; to perform; to manage, as business; to conduct matters. TRANSACT'ING, imp. TRANSACT'ED, pp. TRANSAC'TION, n. *-ăk'shŭn* [F.—L.]: the management of any affair; the performing of any business; that which is done; a proceeding; a process. TRANSAC'TOR, n. *-tėr*, one who transacts.

TRANSALPINE, a. *trăns-ăl'pĭn* [L. *trans*, across, and Eng. *Alpine*]: beyond the Alps, in regard to Rome—viz., on the north of the Alps; opposite of *Cisalpine*.

TRANSATLANTIC, a. *trăns'ăt-lăn'tĭk* [L. *trans*, across, and *Atlantic*]: beyond or across the Atlantic, as *Transatlantic* countries, a *Transatlantic* steamer.

TRANSCALENT, a. *trăns-kā'lĕnt* [L. *trans*, across; *calens*, being warm; *calĕrĕ*, to be warm]: permitting the passage of heat. TRANSCA'LENCY, n. *-lĕn-sĭ*, the state of being transcalent.

TRANSCAUCASIA, *trăns-kaw-kā'shĭ-a:* that portion of Caucasia proper which lies s. of the Caucasus (q.v.), the portion of the n. being called *Ciscaucasia*. Transcaucasia comprises 8 governments: chief town, Tiflis.

TRANSCEND, v. *trăn-sĕnd'* [L. *transcendĕrĕ*, to climb or pass over—from *trans*, beyond; *scando*, I climb]: to rise above; to go beyond; to surmount; to surpass; outdo; excel. TRANSCEND'ING, ppr., rising above; surpassing. TRANSCENDED, pp. TRANSCEND'ENT, a. *-ĕnt* [L. *transcendens* or *transcenden'tem*, climbing over]: very excellent; supremely excellent; among the *Schoolmen*, not included in one of the ten Categories (q.v.): in the philosophy of Kant (q.v.), transcending experience, as the idea of God. TRANSCEND'ENTLY, ad. *-lĭ*. TRANSCEND'ENCE, n. *-ĕns*, or TRANSCEND'ENCY, n. *-ĕn-sĭ*, superior excellence; supereminence. TRANSCENDENTAL, a. *trăn'sĕn-dĕnt'ăl*, super-

eminent; applied by Kant to the various forms, categories, or ideas which he regards as elements of cognition that are manifested only along with experience, though they are not products of experience, as Time, Space, etc.; metaphysical; hence, abstruse; extravagant; absurd. TRAN'SCENDENT'ALLY, ad. *-lĭ.* TRAN'SCENDENT'ALISM, n. *-ăl-ĭzm,* that system of philosophic inquiry which is identified with the name of Kant, and in which the primary principles of knowledge are ascertained *a priori* (see TRANSCENDENTAL): that kind of investigation or use of language which is vague, obscure, or extravagant. New England transcendentalism refers to the teachings of Channing, Emerson, and others. It was not systematically formulated, but in its philosophical character it was an idealism rather elusive, often incoherent. It was a revolt from the orthodoxy, the utilitarianism, the formalism of that day toward what its advocates claimed to be a more spiritual and ideal interpretation of reality. Philosophically it was held that in the human soul there is that which transcends knowledge through the senses. Dependent in its origin upon foreign literatures (not simply German, but Neo-platonic as well), transcendentalism in its theological character was a demand for freedom from creeds, from all spiritual authority, for a religion not based upon tradition or history, but unerringly witnessed in the soul. It was in no accepted sense Christian. There were individual differences, but generally stated transcendentalists did not believe in heaven, hell, evil; they had no Saviour, no church. Emerson said transcendentalism was an 'excess of faith'; but the faith was in human nature as a possible realization of the divine. Its essence was aspiration, not contrition. But transcendentalism was more than theological: it had philosophical, economic and literary characteristics. Whatever gave promise of becoming better, whatever seemed to move toward regeneration, as these men saw the facts, gained their sympathy, often their enthusiastic support. Transcendentalism was, then, not a system, but, as Emerson insisted, a spiritual movement. TRAN'SCENDENT'ALIST, n. one who believes in or adheres to transcendentalism.

TRANSCENDENT'AL — TRANSCEND'ENT [see TRANSCEND]: employed by various Schoolmen, particularly by Duns Scotus (q.v.), to describe the conceptions that, by their universality, rise above or transcend or extend over the ten Aristotelian Categories (see CATEGORIES). Thus, according to Scotus, *Ens,* or Being, because it is predicable of Substance and Accident alike, of God as well as of the World, is raised above these by including or comprehending them; it has the same relation to the sum of the Categories as the *summum genus* to the various genera within a single category—Relation (*summum genus*) to the classes of Related things (included genera). Further, the predicates assumed by Scotus to belong to *Ens,* or simple existence—viz., the One, the True, the

Good—*Unum, Verum, Bonum*—are styled transcendent, because applicable to *Ens* before the *descent* is made to the ten classes of real existence.—In later times, since Kant, the word 'Transcendental' has been largely used as equivalent to the philosophical meaning of *a priori*. See COMMON SENSE, THE PHILOSOPHY OF; INSTINCT.

Between the hitherto convertible terms Transcendental and Transcendent, Kant himself drew a distinction, of considerable importance in understanding his own system. By the word 'Transcendental' he designates the various forms, categories, or ideas assumed to be constitutive or regulative elements of cognition; implying that, though they are not products of Experience, they are manifested only along with experience; such are Space and Time, Causality, etc. The word 'Transcendent' Kant reserves for those among the transcendental or *a priori* elements that altogether transcend experience and knowledge. They may seem to be given in experience, but they are not really so given. Such are the 'ideas of the Pure Reason,' God, an Immaterial Soul, etc. Transcendental elements, when legitimately applied to experience, as Causality and Relation, are called Immanent.

TRANSCENDENTAL NUMBERS, in Mathematics: numbers which are not roots of algebraic equations with integral coefficients. Familiar instances are the ratio π of the circumference of a circle to the diameter, and the exponential base *e*.

TRANSCRIBE, v. *trăn-skrīb'* [L. *transcrībĕrĕ*, to transfer in writing—from *trans*, over; *scrībo*, I write]: to write over again, or in the same words; to copy. TRANSCRI'BING, imp. TRANSCRIBED', pp. *-skrībd'*. TRANSCRI'BER, n. *-bėr*, one who transcribes. TRANSCRIPTION, n. *trăn-skrĭp'shŭn* [F.—L.]: the act of copying; the copy made; in *music*, the adaptation of a composition for a particular instrument. TRANSCRIPT, n. *trăn'skrĭpt* [L. *scriptus*, written]: a copy; anything written from and according to an original. TRANSCRIP'TIVE, a. *-tĭv*, relating to or being a copy. TRANSCRIP'TIVELY, ad. *-lĭ*.

TRANSE, *trăns:* the old and proper spelling of TRANCE (q.v.).

TRANSED, a. *trănst:* OE. for ENTRANCED.

TRANSEPT, n. *trăn'sĕpt* [L. *trans*, across; *septum*, a fence, an inclosure]: the portion of a cruciform church between the nave and the choir, which projects at right angles to the body, forming the arms of the cross.

TRANSFER, v. *trăns-fėr'* [L. *transfer'rĕ*, to transport—from *trans*, over; *fero*, I bear or carry]: to convey from one place or person to another; to make over; to convey, as a right from one to another; to sell; to convey (a writing, drawing, or the like) from one surface to another by means of transfer-paper, as to a lithographic stone. TRANSFER, n. *trăns'fėr*, the conveyance of a thing from one place or person to another; the conveyance of a

right, title, or property from one person to another; the placing or conveyance from one position, place, or condition into another; the reversed mark or impression made on a lithographic stone. TRANSFER'RING, imp.: N. the act of conveying from one to another, as a right or property. TRANSFERRED', pp. *-fėrd'*. TRANSFER'RER, n. *-rėr*, one who transfers. TRANSFER'ABLE. *-fėr'ă-bl*, or TRANSFER'RIBLE, a. *-rĭ-bl*, that may be conveyed from one to another; negotiable, as a bill of exchange. TRANSFER'ABIL'ITY, n. *-bĭl'ĭ-tĭ*, or TRANSFER'RIBIL'ITY, n. quality of being transferable. TRANSFEREE, n. *trăns-fėr-ē'*, the person to whom a thing is transferred. TRANS'FERENCE, n. *-ĕns*, the act of conveying from one to another; the passage of a thing from one place to another; in the *law of Scotland*, the step by which a pending suit is transferred from a person deceased to his representative. TRANSFER-BOOK, a register of transfers of shares or stocks. TRANSFER-DAYS, the days on which stock can be sold out or transferred at the Bank of England. TRANSFER OF HEAT, the transmission of heat from the furnace of a boiler to the water in the boiler. The rate of transmission or the number of heat units transferred per hour varies according to the amount of heating surface, and is directly proportional to the thickness of the plates. Furnace area is more efficient than tube area. TRANSFER-PAPER, prepared paper on which lithographers impress, write, or draw their designs, from which they are impressed or put upon the stone, and then printed from; fine unsized paper on which copies of recently written letters are impressed by the copying-machine.—SYN. of 'transfer, v.': to remove; transport; alienate; estrange; sequester; sell; deliver.

TRANSFIGURE, v. *trăns-fĭg'ūr* or *-fĭg'ėr* [F. *transfigurer*, to transfigure—from L. *transfig'urārĕ*—from *trans*, over, from one to another; *figūra*, form, shape]: to change the appearance or outward form of; to transform; to glorify. TRANSFIG'URING, imp. TRANSFIG'URED, pp. *-fĭg'ėrd*, changed as to outward form. TRANSFIG'URA'TION, n. *-ū-rā'shŭn* [F.—L.]: change of form; with the definite article, the supernatural change in the personal appearance of our Lord on the Mount, described in Matt. xvii. 1-9.

TRANSFIX, v. *trăns-fĭks'* [L. *transfix'us*, transfixed—from *trans*, through; *fixus*, pp. of *figo*, I fasten]: to pierce through, as with a pointed weapon. TRANSFIX'ING, imp. TRANSFIXED', pp. *-fĭkst'*. TRANSFIX'ION, n. *-fĭk'shŭn*, the act of transfixing or state of being transfixed.

TRANSFORM, v. *trăns-fawrm'* [L. *trans*, across; *forma*, a shape]: to change the shape or appearance of; to change, as one substance into another; to change the heart or natural disposition; to be changed in form or substance. TRANSFORM'ING, imp.: ADJ. able to effect a change of form or state. TRANSFORMED', pp. *-fawrmd'*, changed; renewed. TRANSFORMATION, n. *trăns'fŏr-mā'-*

shŭn, act of changing, or state of being changed; metamorphosis; a change of heart or disposition. TRANSFORMATIVE, a. *trăns-fawrm'ă-tĭv,* having power or a tendency to transform.

TRANSFORMER: a device for changing the pressure or current of electric energy supply. Usually, a stationary electromagnetic device consisting of a laminated iron core and two insulated windings, a primary and a secondary. The device transfers electric power of alternating currents from the primary to the secondary circuit, and changes the voltage in the ratio of the number of turns in the two windings. TRANSFORMER, STEP-DOWN: a transformer which locally lowers the electric pressure; i.e., which has a lesser number of turns in the secondary than in the primary winding and thereby produces a lower voltage in the secondary circuit than in the primary. TRANSFORMER, STEP-UP: a transformer which locally raises the electric pressure; i.e., which has a greater number of turns in the secondary than in the primary winding and thereby produces a higher voltage in the secondary circuit than in the primary.

TRANSFUSE, v. *trăns-fūz'* [F. *transfuser,* to transfuse —from L. *trans,* through; *fūsus,* pp. of *fundĕrĕ,* to pour]: to transfer by pouring; to transfer, as blood, from one living animal to another; to cause to be instilled or imbibed, as love of country. TRANSFU'SING, imp. TRANSFUSED', pp. *-fūzd'.* TRANSFU'SIBLE, a. *-fū'zĭ-bl,* that may be transfused. TRANSFUSION, n. *trăns-fū'zhŭn* [F.—L.]: the introduction of the blood of one living animal into the vessels of another. The operation seems to have been known to the medical profession for many centuries; and there are obscure allusions in the Roman poets, which may indicate that it was practiced as early as the Augustan age:

> Ut repleam vacuas juvenili sanguine venas.
>
> ***Ovid.***

The earliest authentic case on record is, so far as we know, that of Pope Innocent VIII., who was unsuccessfully operated on in 1492. The experiment was tried three times, and at the cost of the lives of three boys, probably from air getting into their veins, but without any effect in saving that of the pope. Denys of Montpelier, 1667, injected the blood of calves into the veins of a young man who had been much weakened, and had become torpid and slightly dropsical, in consequence of repeated bleedings. The first operation restored him to perfect health. In the same year, Lower, of Oxford, publicly made a similar experiment, which seems to have been successful. Other instances of the operation are on record; but it soon fell into obscurity, doubtless from lack of success, due partly to use of the blood of calves and sheep, instead of human blood, and partly to hopeless cases of old age and decrepitude being selected for its application.

At the present day, transfusion of blood is largely re-

stricted to cases of profuse hemorrhage—its benefits being probably twofold: 1, the actual restitution of blood which has been lost; 2, the supply of sufficient blood to the heart to stimulate it to contraction, and thus to enable the circulation to be carried on until fresh blood is formed. Its stimulant action is much the most important; and if the operation is performed before the vital energies are entirely exhausted, the effect is most marked. The operation has proved successful also in a case of coma from the fumes of carbonic oxide and carbonic acid. Panum first demonstrated that defibrinated blood is in every respect as well suited for the operation as pure blood. The beneficial effects of transfusion of blood are in most cases obtained equally by the injection into the veins or the cellular tissue of a solution of the salts of the blood in the same proportion as they exist in this fluid. Transfusion of blood has been suggested in cases of cattle-disease. As it would be impossible, without danger, to bring a healthy animal in contact with a diseased one, the value of Panum's discovery, provided the proposed remedy be successful, is obvious; for the blood of healthy oxen killed for the market could be defibrinated by whipping and straining, and would remain for many hours fit for injection, when raised to the normal temperature.

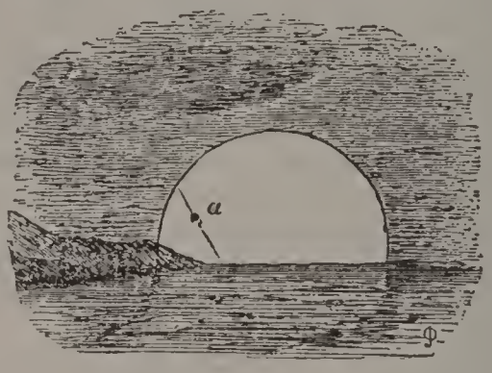
TRANSGANGETIC, a. *trăns'găn-jĕt'ĭk* [L. *trans*, across, beyond; *Ganges*, the great river of Hindustan]: connected with the countries beyond the Ganges; on the opposite side of the Ganges.

TRANSGRESS, v. *trăns-grĕs'* [F. *transgresser*, to transgress—from L. *transgressus*, pp. of *transgredĭor*, I step over—from *trans*, across; *gradĭor*, I step]: to pass over or beyond a limit; to break or violate; to offend by the violation of a command; to infringe; to sin. TRANSGRES'SING, imp. TRANSGRESSED', pp. *-grĕst'*. TRANSGRESS'OR, n. *-sẽr*, one who transgresses; an offender. TRANSGRES'SION, n. *-grĕsh'ŭn* [F.—L.]: the act of violating any law or rule of moral duty; a fault; a crime; a sin. TRANSGRES'SIONAL, a. *-ăl*, involving transgression. TRANSGRES'SIVE, a. *-grĕs-sĭv*, faulty; apt to transgress; consisting in transgression. TRANSGRESS'IVELY, ad. *-lĭ*.—SYN. of 'transgression': crime; misdemeanor; misdeed; fault; offense; infringement; affront; violation; wrong; iniquity; wickedness; injustice; injury.

TRANSHIP, v. *trăns-shĭp'* [L. *trans*, over, and Eng. *ship*]: to convey from one ship or conveyance to another. TRANSHIP'MENT, n. the act of transferring goods from one ship or conveyance to another.

TRANSIENT, a. *trăn'shĕnt*, or *-sĭ-ĕnt* [L. *transĭens* or *transĭen'tem*, going or passing over; *transīrĕ*, to pass over—from *trans*, across; *īrĕ*, to go]: passing; of short duration; soon passed; fleeting; momentary. TRAN'SIENTLY, ad. *-lĭ*. TRAN'SIENCE, n. *-shĕns*. TRAN'SIENCY, n. *-sĭ*, or TRAN'SIENTNESS, n. *-nĕs*, the state of being transient; shortness of continuance.

TRANSIT, n. *trăns'ĭt* [L. *transĭtus*, a passing over; *transīrĕ*, to pass over—from *trans*, over; *īrĕ*, to go: It. *transito*]: a passing over or through; conveyance; the passing of a heavenly body over the disk or face of another one, as the *transit* of Venus (across the face of the sun); the daily passage of a star across the meridian of a place. TRANSITION, n. *trăn-zĭsh'ŭn* [F.—L.]: passage from one place or state to another; change; in *music*, a passing from one key to another; in *geol.*, a passage from one state or period to another: ADJ. noting change from one condition or state to another. TRANSI'TIONAL, a. *-ŭn-ăt*, or TRANSI'TIONARY, a. *-ĕr-ĭ*, pertaining to or denoting transition. TRANSITIVE, a. *trăns'ĭ-tĭv*, having the power of passing; in *gram.*, denoting a verb whose action passes over to, or which has an effect upon, a noun or pronoun. TRANS'ITIVELY,



Transit of Mercury:
a, Mercury. The dotted line shows the path.

ad. *-lĭ*. TRANS'ITIVENESS, n. *-nĕs*, the state or quality of being transitive. TRANSIT-INSTRUMENT, an astronomical instr., of which a telescope forms an essential part, and by which the exact moment of a heavenly body's transit across the meridian of the place of observation is ascertained (see below). TRANSIT DUTY, duty charged on goods in transit. TRANSITION ROCKS or STRATA, in *geol.*, the strata that were deposited at a period when the earth and sea were passing into a state fit for the reception of organized being; the metamorphic strata. TRANS'ITORY, a. *-ĭ-tĕr-ĭ*, passing without continuance; uncertain in duration; speedily vanishing; fleeting; temporary; short-lived. TRANS'ITORILY, ad. *-lĭ*. TRANS'ITORINESS, n. *-nĕs*, a passing with a short continuance.

TRANS'IT-INSTRUMENT: important astronomical instrument, consisting of a telescope fixed to a horizontal axis, so as to revolve in the plane of the meridian; and employed in the observation of the meridian transits of the heavenly bodies. The axis, the most important part of the instrument, and thus demanding the utmost care in its construction, consists of a hollow sphere or cube, to opposite sides of which are tightly fastened the bases of two cones in whose apices the pivots are screwed; the sphere or cube is pierced for the admission of the telescope, which is firmly soldered at right angles to the axis. One of the pivots is hollowed so that a stream of light can be directed

from a lantern half-way along the interior of the axis, and through an aperture in the side, into the telescope tube, where, being received by an annular mirror, set at 45° to the axis and telescope tube, it is directed to the eye-piece, and brilliantly illumines the field of view, while the annular form of the mirror prevents any interference with the passage of rays from the object under observation to the eye. The pivots must be very carefully turned to a perfectly cylindrical form, and fitted into the instrument so that their axes are accurately in line. One extremity of the axis carries one and sometimes two small graduated circles, each supplied with index, clamping screws, and vernier; these circles are capable of indicating angular measures to within 1′ or 2′. The pivots rest on massive blocks of stone or other stable material which is little effected by change of temperature, stability being the great mechanical essential of the instrument. This condition satisfied, there are three adjustments necessary before a transit can be observed: the axis must be horizontal; the line of collimation must be at right angles to the axis of motion; and the latter must be placed to point accurately east and west. On the perfection of the first two of these adjustments depends whether the telescope sweeps over a great circle of the sphere, and the third is necessary to insure that this great circle shall be the meridian of the place of observation. These adjustments can never be made quite perfect, and the usual mode is to investigate the amount of error in each, and allow for it in the apparent result. To note accurately the instant of time by the astronomical clock, at which the object (e.g., a star) is seen to pass the centre of the field of view, is the essential part of a transit observation. The most effective method is to register the beats of the clock by an apparatus which, at the end of each oscillation of the pendulum, marks a dot upon a uniformly moving slip of paper. This is effected by the agency of electricity, and is one of the most valuable contributions of electrical to astronomical science. At a certain point in each oscillation of the pendulum, it becomes part of a complete galvanic circuit, the contact being immediately broken by its progression in its oscillation; and it is at these points that the galvanic agency causes the dot to be made. The instant of a transit's occurrence is similarly noted by the observer, who, by a tap on a break-circuit key fastened to the side of the transit-instrument, causes the graver to make an extra dot; and the distance of this dot from the previous seconds dot, compared with the distance between two seconds dots, gives the time accurately almost to one-hundredth of a second. Various ingenious modes of registering have been proposed, all founded on the above principles. It is from the times of transit of the several heavenly bodies thus observed, that their right ascensions are determined.

The transit-instrument was invented by Römer about 1690. One was erected in Greenwich Observatory by Halley 1721, but it was little used till 1742.—See CIRCLE, MURAL.

TRANSKEI TERRITORY, *trăns-kē′:* dependency of the Cape Colony, between the Great Kei river (which is the boundary of Brit. Kaffraria) and the borders of Natal. Covering most of what was known formerly as Kaffraria (q.v.) proper, the T. T. is now divided into Griqualand East, Tembuland, and Transkei in the stricter sense—the latter comprising Fingoland, the Idutwya Reserve, and Gcalekaland. The last independent portion, Pondoland, was annexed 1884.—See CAPE OF GOOD HOPE.

TRANSLATE, v. *trăns-lāt′* [OF. *translater*—from L. *translātus*, carried or brought over, transferred—from *trans*, over; *lātus*, carried: It. *translatare*]: to carry or remove from one place to another; to remove from one see or pastoral charge to another, as a bishop or clergyman; to convey; to remove or convey to heaven without death (e.g., Enoch and Elijah); to change into another form; to transform; to render into another language; to interpret. TRANSLA′TING, imp. TRANSLA′TED, pp. TRANSLA′TOR, n. *-tėr*, one who expresses the sense of words in one language by those of another; an instrument for converting one form of energy into another; a sensitive receiving-instrument used by telegraphers for retransmitting a message or for translation; a 'relay.' TRANSLA′TABLE, a. *-tă-bl*, that may be expressed in the words of another language. TRANSLA′TION, n. *-shŭn* [F.—L.]: change or removal from one place to another, as a bishop; the removal of a person to heaven without tasting death; the act of expressing the words of one language by the words of another; interpretation; a version. TRANSLA′TIVE, a. *-tĭv*, taken from others. TRANSLA′TORY, a. *-tėr-ĭ*, transferring; serving to convey or change. TRANSLA′TRESS, n. *-trĕs*, a woman who translates.

TRANSLEITHANIA, *trăns-lī-thā′nē-a:* name of the part of Austro-Hungary e. of the Leitha river; comprising Hungary proper, Transylvania, Croatia, and Slavonia.—See CISLEITHANIA.

TRANSLITERATE, v. *trăns-lĭt′ėr-āt* [L. *trans*, across, beyond; *litĕra*, a letter]: to express the words of one language, such as Arabic, Sanskrit, or Chinese, by the letters or characters of another, as to *transliterate* Japanese words by spelling with English letters. TRANSLIT′ERATING, imp. TRANSLIT′ERATED, pp. TRANSLIT′ERA′TION, n. *-ā′shŭn*, the act of rendering the characters of one language by the letters of another.

TRANSLUCENT, a. *trăns-lō′sĕnt* [L. *translūcens* or *translūcen′tem*, shining through; *translucērĕ*, to shine through—from *trans*, through; *lucērĕ*, to shine—from *lux* or *lūcem*, light]: transmitting rays of light, but not in sufficient quantity to permit objects to be seen through it, as a *translucent* mineral; semi-transparent; in *poetry*, pellucid; clear; transparent. TRANSLU′CENTLY, ad. *-lĭ*. TRANSLU′CENCE, n. *-sĕns*, or TRANSLU′CENCY, n. *-sĕn-sĭ*, that property of certain minerals and other substances which permits light to pass through them, but not in sufficient quantity to show distinctly the forms and colors of objects placed on their other side. TRANSLU′CID, a. *-sĭd*, semi-transparent; clear.

TRANSMARINE, a. *trăns'mă-rēn'* [L. *trans*, beyond, and *mărīnus*, of or belonging to the sea—from *mărĕ*, the sea]: beyond the sea.

TRANSMIGRATE, v. *trăns'mī-grāt* [L. *transmigrātus*, removed across—from *trans*, beyond; *migrātus*, pp. of *migrārĕ*, to remove]: to pass over or into another country; to emigrate; to pass from one body into another, and become incarnate in it, as the soul. TRANS'MIGRATING, imp. TRANS'MIGRATED, pp. TRANS'MIGRATOR, n. *-grā-tẽr*, one who transmigrates. TRANS'MIGRA'TION, n. *-grā'shŭn*, the passing of persons from one country to another for the purpose of residence; the passing of a thing into another state; the passage of the soul into another body after death; metempsychosis (see TRANSMIGRATION OF SOULS). TRANSMIGRATORY, a. *trăns-mī'grā-tẽr-ĭ*, passing from one place or state to another.

TRANSMIGRA'TION OF SOULS: supposed passing of the souls of men at death into the bodies of other persons, or into the bodies of animals; metempsychosis. The belief in such a transition is one of the most important phases in the religions of mankind. It was common to the most uncivilized and the most civilized nations; it was the object of fantastical superstition and of philosophical speculation; and it is the property of both ancient and modern times. Its basis being the assumption that the human soul does not perish with the body, it could belong to those nations only which had already conceived an idea of the immortality of the soul; but in proportion as such an idea is crude or developed, as it is founded merely on a vague fear of death and a craving for material life or on ethical grounds and a supposed causal connection between this and a future life, the doctrine of T. assumes various forms, and influences more or less the actions of men.

The lowest forms of this belief are probably those among several tribes of Africa and America, which hold that the soul, immediately after death, must look out for a new owner, and, if need be, enter even the body of an animal. Several negro tribes therefore bury their dead near the houses of their relatives, in order to enable the souls of the former to occupy the newly-born children of the latter, and the princely souls to re-enter the princely family; and until the soul is thus accommodated, milk, brandy, and food are placed on the grave of the deceased, to keep it, as it were, from starving; and sometimes holes are dug in the grave, to facilitate the soul's egress from it. In N. America, some tribes slaughter their captives to feed with their blood such souls in suspense. The negro widows of Matamba are especially afraid of the souls of their husbands, for at the death of these they immediately throw themselves into the water, to drown their husbands' souls, which otherwise, as they suppose, would cling to them. The natives of Madagascar seem to have invented a kind of artificial T.; for in the hut where a man is about to die they make a hole in the roof, in order to catch the outgoing soul, and to breathe it into the body of another man on the point of death. From these and instances of a sim-

ilar kind, it appears that nations which entertain such a belief in T. assume that the souls of the deceased must continue to dwell on earth, and that one human being may be possessed of several souls. With them the final destination of the soul is a matter of comparative indifference; its transition from one body into another a mere matter of chance, devoid—apparently, at least—of any ethical principle, and therefore without any moral effect on the living, except, perhaps, that of a stolid indifference to death, as often manifested in the plantations of the W. Indies, where negroes hang themselves in the belief that their souls will migrate into other countries, and there enjoy a happier life.

Another, more poetical and more ideal, form of this belief in T. occurs in Germanic mythology, and is still entertained in parts of Germany and England. According to it, the soul, before entering its divine abode, assumes certain forms, or animates certain objects, in which it lives for a short period. Thus, it is supposed to enter some flower or tree, a rose, a vine, a plantain, a pine-tree; or to animate a butterfly, a pigeon, and sometimes also—if a person dies while enchanted or sleeping—a serpent, a weasel, or a mouse. The most popular form of these supposed transmigrations is that of a pigeon, which bird, therefore, is often represented on the oldest tombstones. When the robber Madej, for instance, under an apple-tree confessed his crimes, one apple after another, transformed into a white pigeon, flew into the air. They were the souls of the persons murdered by him; only one apple remained, because he had not yet confessed the murder of his father; but when he did so, the last apple also—the soul of his father—assuming the shape of a gray pigeon, flew after the rest.

Different from this kind of belief in T. is that based on ethical grounds. It proceeds from the theory that human souls, being of divine essence, are originally pure, but during their earthly career lose their purity; being destined, however, to regain their original quality, they are reborn again and again, until they have become free from fault, and thus worthy of re-entering the place of their origin. A belief of this nature was entertained by the old Mexicans, probably by the Druids also. It is met in more developed form with the old Egyptians; but its real importance it obtained as a tenet of the religion and philosophy of the Brahmanical Hindus and the Buddhists, whence it passed into the doctrine of several philosophers of ancient Greece, and into that of some Jewish and Christian sects. The ethical and philosophical value of such a belief is necessarily relative. It will depend on what a religion or philosophy may call right or wrong, virtue or sin; it will depend likewise on the notions which religion or philosophy may entertain on the origin of the human soul, on the cause of its first birth, and on its ultimate destination, whether this destination is the merging of the soul into the essence of its Creator, or a personal immortality; also the mode in which such a personal immortality

is conceived will necessarily influence the mode in which T. is supposed to take place. Where the ideas on these questions have remained crude, the idea of T., too, has little ethical or philosophical worth. The old Mexicans imagine that the gods *Ometeuctli* and *Omecihuatl* create in heaven the soul of a child destined to be born, and that by its acts on earth it will either ascend to the abode of the highest felicity, or remain in an intermediate heaven, or fall to hell. The highest goal, in the house of the sun with the god *Huitzilopotchli*, is full of pleasure and joy, and is attained only by the souls of fallen warriors, or those who died in captivity, and women dying in childbirth. The second or intermediate heaven, cool and pleasant, but of moderate enjoyments, falls to the lot of men who are not wicked. The wicked, however, go to the abode of darkness; and in darkness consists their punishment. But those entitled to the second heaven may, if they like, return to earth to qualify themselves for the highest heaven, if such is their aspiration. Of the Druids it is told by classical writers that they believed in the immortality of the soul and in its migration after a certain period subsequent to death. Little is known of the manner in which they imagined such migrations to take place; but, to judge from their religious system, there can be no doubt that they regarded transmigrations as a means of purifying the soul and preparing it for eternal life.

According to the doctrine of the old Egyptians, the human race originated after the pure gods and spirits had left the earth—departing because the demons who inhabited the earth had revolted against them, and therefore tainted it with guilt. But, to enable the demons to purge themselves of their guilt, the gods created earthly bodies, which the demons were sentenced to animate, so that by expiations they might regain their state of original purity. And these earthly bodies, united to the demons, are the human race; their souls were therefore created at the same time as those of the gods; and human life—the connection of body and soul—is intended merely as a means of purifying the soul which had rebelled against its divine nature. All the precepts regulating the course of life are laid down by the Egyptians for this end; and the judgment passed after death, in the palace of Osiris, decides whether it has been attained or not. If it has not, the soul must return to the earth again, to renew its expiations; and according to the nature and measure of the guilt which it had contracted during its previous career, it must form a new union with a human body, or with the body of an animal, or even a plant. But if the soul is declared pure by the judge of the dead, it gradually ascends through the various regions of heaven, to the highest abodes of the gods and pure spirits, presided over by Phtah and Neith.

At the time when in *India* the dogma of T. became an integral part of the Brahmanic religion, the Hindus believed that human souls emanated from a supreme Being, which, in a state of bewilderment or forgetfulness, allowed them to become separate existences and to be born on

earth. The soul, thus severed from the real source of its life, is bound to return to it, or to become merged again into that divine substance with which it was originally one; but as its nature becomes contaminated with sin through its earthly career, it must, so long as it remains in this world, endeavor to free itself from all guilt, and thus to become fit for its ultimate destiny. Religion teaches that this is done by the observance of religious rites, and a life in conformity with the precepts of the sacred books; philosophy, that the soul will be reunited with Brahma if it *understands* the true nature of the divine essence whence it comes. So long, therefore, as the soul has not attained this condition of purity, it must be born again, after the dissolution of the body to which it was allied; and the degree of its impurity at one of these various deaths determines the existence which it will assume in a subsequent life. See INDIA—*Religion and Philosophy:* UPANISHAD.

Since there can be no proof of the soul's migrations, the detail in which these are described in the religious works of the Hindus is merely fantastical, and interesting only so far as it affords a kind of standard by which, at various epochs and by different writers, the moral merit or demerit of human actions was measured in India. Thus, Manu (in the 12th book of his Code of Laws) teaches: 'A Brâhman'a who drinks spirituous liquor will migrate into the bodies of a worm, an insect, a grasshopper, a fly feeding on ordure, or some mischievous animal. A twice-born who steals (the gold of a Brâhman'a) will pass a thousand times into the bodies of spiders, snakes, and chameleons, of aquatic monsters, or of murderous blood-thirsty demons. He who violates the bed of his guru (spiritual teacher) will a hundred times migrate into the forms of grasses, of shrubs, and of creeping plants, of carnivorous animals and beasts with long teeth, or of cruel brutes. Those who inflict injury (on sentient beings) become flesh-eaters; and those who eat forbidden things, worms. . . . If a man, through covetousness, has stolen . . . grain, he becomes a rat; . . . if honey, a gadfly; if milk, a crow; if juice (of the sugar-cane or the like), a dog; if clarified butter, an ichneumon; if flesh, a vulture; . . . if oil, a cockroach;' etc. A more general doctrine of the migration of souls is based by Hindu philosophers on the assumption of the three cosmic qualities—viz., *sattwa*, i.e., purity or goodness; *rajas*, i.e., troubledness or passion; and *tamas*, i.e., darkness or sin—with which the human soul may become endued. Thus, Manu teaches that 'souls endued with the quality of *sattwa* attain the condition of deities; those having the quality of *rajas*, the condition of men; and those having the quality of *tamas*, the condition of beasts.' Each of these conditions, he continues, is —according to the acts or knowledge of the soul—threefold: the lowest, the middle, and the highest. 'The lowest embodiment of the quality *tamas* is inanimate objects, worms, insects, fish, serpents, tortoises, tame and wild beasts.' From this, the lowest of the nine conditions into

which the soul migrates, Manu specifies minutely the grades higher and higher, until he ends the catalogue with the highest: 'The highest condition to which the quality of *sattwa* leads is that of the god Brahmâ, that of a creator of the world (as *Marîchi*, or another patriarch of the same rank), that of the genius of *Dharma* (virtue or right), of *Mahat*, or the intellectual principle of creation, and of *Prakr'iti*, or matter.' See SÂNKHYA. Other Hindu teachers give different details of the migrations; but since all orthodox Hindu writers agree in principle with Manu, the quotations above given suffice to illustrate the imaginary positiveness with which the doctrine of T. was propounded, as well as the fact that this doctrine rested, in India, on ethical grounds.

It has been noted above that the belief in the soul's life after the death of the body must precede the doctrine of transmigration. This belief has been supposed traceable in some hymns of the *R'igveda* (see VEDA); but aside from the fallacy in speaking of this Veda as a contemporaneous whole, the only passage adduced in proof of this important discovery fails on examination to give evidence for any conclusion whatever on the subject.

The *Buddhistic* belief in transmigration is derived from that of the Brahmanic Hindus; it agrees with the Brahmanic in principle, though differing in the imaginary detail in which it was worked out.

Like the Brahmanic Hindus, the Buddhists believe that all souls have existed from the beginning; like them, they believe in the unreality and sinfulness of the world, in the necessity of the soul's freeing itself from the bondage of this world, and in the causal connection between the actions of man in this and his condition in a subsequent life. Like the Brahmanic Hindus, they hold, therefore, that sin is the cause of T., and that by a total expiation of sin the soul ceases to be reborn and attains its final resting-place. But since this resting-place is to the Buddhists Nirvâna (q.v.), or Nonentity, whereas to Brahmanism it is Brahman, or the principle of Entity; since Buddhists reject the institution of caste, which is the social foundation of Brahmanic life; since they do not acknowledge the authority of the Vedas, and the codes based on them—the moral standard of a Buddhist must differ from that of a Brahmanic Hindu; and his ideas of reward and punishment, as reflected by his ideas of T., must likewise differ. The *detail* of the Buddhistic doctrine of T. is as fanciful as that of the Brahmanic doctrine (see BUDDHISM: LAMA). One great difference, however, separates the notions of one class of Buddhists from those of the rest, as well as from those of the Brahmanic Hindus. According to the latter, and the great mass of Buddhists, it is always the same soul which ever from its first birth reappears in its subsequent births, until it is finally liberated from T. But in the belief of the southern Buddhists, the succession of existences of a being is a succession also of souls; and each such soul, though the result of its predecessor, is not identical with it. According to this view, the body dies, and with

it the soul too is 'extinguished,' leaving behind only the good and bad acts which it has performed during its life. The result of these acts now becomes the seed of a new life, and the soul of this new life is therefore the necessary product of the soul of the former life. Thus all the succeeding souls have to labor at the solution of the same problem, which began when their first ancestor entered this world; but no succeeding birth is animated by the same soul. This dogma is illustrated in their works by various similes—e.g., one lamp is kindled at another; the light of the former is not identical with that of the latter; nevertheless, without the former, the other light could not have originated. Or, a tree produces fruit; from the fruit, another tree arises, and so on; the last tree is therefore not the same tree as the first, though the fruit is the necessary cause of the last.

In Greece, the doctrine of Transmigration—or, as it was there called, *metempsychosis*—did not become the belief of the people, but was confined to the teaching of the mysteries and the tenets of philosophers, who probably derived it, directly or indirectly, from Egypt or India. According to some, Thales (q.v.) was the first Greek philosopher who propounded it; according to others, Pherecydes (q.v.), teacher of Pythagoras (q.v.); but it obtained importance in Greek philosophy first through the system of Pythagoras, who seems to have gained his knowledge of it from Egyptian sources. After him, Plato (q.v.) assigned T. a prominent place in his philosophy; and he probably was indebted to Hindu writers for his views on metempsychosis, as explained in his dialogues, especially *Phædros*. Plato's doctrine was refuted by Aristotle, but revived, in modified form, by the Neo-Platonists.

Since a belief that the consequences of the acts of man must follow their inevitable course, and can neither be averted nor stopped by the interposition of a divine power, is incompatible with a belief in the forgiving and purifying grace of God, the doctrine of T. could never gain firm ground in the religion of the Jews or of the Christians. However, in both these religions it found occasional adherents in ancient and modern times. Among the Jews, the doctrine of T.—the *Gilgul Neshamoth*—was taught in the mystical system of the *Kabbala*, which pretends to divulge the secrets of creation and of the nature of the divine and human soul, and whose principle is the same as that of Brahmanism. The souls, like all other existences of this world, it teaches, must re-enter the absolute substance whence they have emerged. But to accomplish this end, they must develop all the perfections whose germ is planted in them; and if they have not fulfilled this condition during one life, they must begin another, a third, and so onward, until they have acquired the condition which fits them for their reunion with the divine. This doctrine was shared in by rabbis of highest renown, and was held by some in connection with wildly fantastic theories, such as that souls migrate into the bodies of other men—Adam's soul migrating into David, etc. Modern Kabbalists—e.g., Isaac Lc

ria—have imagined that divine grace sometimes assists a soul in its career of expiation by allowing it to occupy the same body jointly with another soul, when both are to supplement each other with aid, like the blind and the lame walking in a pair. Sometimes only one of these two souls requires a supplement of virtue, which it obtains from the other soul better provided—the better-provided soul becoming then, as it were, the mother of the other soul, bearing it under her heart like a pregnant woman.

Among the early Christians, according to St. Jerome, the doctrine of T. was taught as a traditional and esoteric one, communicated to only a selected few; and Origen, like the Kabbalists, considers it as the only means of explaining some biblical traditions—e.g., that of the struggle of Jacob and Esau before their birth; and as explaining some events which (as he thinks) would throw discredit on divine justice unless they were justified by good or bad acts done in a former life. Of Christian sects, the Manicheans (q.v.) especially adhered to this belief; but the church always rejected it as a heresy.

In modern times, at least one great philosopher has advanced views of the progress of mankind involving the principle of T.—the celebrated German critic G. E. Lessing, who endeavored to establish it on metaphysical grounds. His arguments are briefly these: The soul is a simple being, capable of infinite conceptions. But being a finite being, it is not capable of such infinite conceptions at the same time; it must obtain them only gradually in an infinite succession of time. If, however, it obtain them gradually, there must be an order in which, and a degree to which, these conceptions are acquired. This order and this measure are the bodily senses. At present, the soul has of such senses five; but neither is there any ground to assume that it began with having five senses, nor is there ground to assume that it will stop with five. For, since nature never takes a leap, the soul must have gone through all the lower stages before it arrived at that which it occupies now; . . . and since nature contains many substances and powers not accessible to those senses with which it is now endued, it must be assumed that there will be future stages at which the soul will have as many senses as correspond with the powers of nature. And 'this my system' he writes in his little essay, *Dass mehr als fünf Sinne für den Menschen sein können*—in a fragmentary note discovered after his death—'this my system is certainly the oldest of all philosophical systems; for it is in reality no other than the system of the pre-existence of the soul and metempsychosis.'

TRANSMISSIBLE, a. *trăns-mĭs'sĭ-bl* [F. *transmissible*, transmissible—from L. *trans*, beyond; *missus*, pp. of *mittĕrĕ*, to send]: that may be transmitted or passed from one to another, or through a body. TRANSMIS'SIBIL'ITY, n. *-bĭl'ĭ-tĭ*, the quality of being transmissible. TRANSMIS'SION, n. *-mĭsh'ŭn* [F. *transmission*—from L. *transmissĭō* or *transmissĭōnem*, a sending across]: the act of sending, or state of being sent, from one to another; passage through. TRANSMIS'SIVE, a. *-mĭs'sĭv*, transmitted; communicated from one to another.

TRANSMIT, v. *trăns-mĭt'* [L. *transmit'tĕrĕ*, to send across; to transmit—from *trans*, over; *mitto*, I send: F. *transmettre*]: to send from one person or place to another; pass along; hand down; to suffer to pass through. TRANSMIT'TING, imp. TRANSMIT'TED, pp. sent from one to another. TRANSMIT'TER, n. *-tĕr*, one who or that which transmits. TRANSMIT'TIBLE, a. *-tĭ-bl*, that may be transmitted or sent from one to another. TRANSMIT'TANCE, n. *-tăns*, or TRANSMIT'TAL, n. *-tăl*, transmission.

TRANSMOGRIFY, v. *trăns-mŏg'rĭ-fī* [familiar slang: L. *trans*, across]: *familiarly*, to change into a different shape; to change into some other person or thing as if by magic. TRANSMOG'RIFYING, imp. TRANSMOG'RIFIED, pp. *-fīd* TRANSMOG'RIFICA'TION, n. *-fĭ-kā'shŭn*, the act of transmogrifying or state of being transmogrified.

TRANSMUTE, v. *trăns-mūt'* [L. *transmutārĕ*, to transmute—from *trans*, across; *mūto*, I change: F. *transmuer*]: to change from one nature, form, or substance into another. TRANSMU'TING, imp.: N. the act of transforming into another nature or substance. TRANSMU'TED, pp. TRANSMU'TABLE, a *-mū'tă-bl*, that may be changed into another nature or substance. TRANSMU'TABLY, ad. *-tă-blĭ*. TRANSMU'TABIL'ITY, n. *-bĭl'ĭ-tĭ*, or TRANSMU'TABLENESS, n. *-bl-nĕs*, quality of being transmutable. TRANSMUTATION, n. *trăns'mū-tā'shŭn* [F.—L.]: change into another substance, form, or nature; in *alchemy*, the transformation of the baser into the more precious metals; in *geol.*, a change from one place to another, or from one thing into another. TRANSMU'TER, n. *-tĕr*, one who or that which transmutes. TRANSMU'TUAL, a. *-tū-ăl*, reciprocal.

TRANSNORMAL, a. *trăns-nŏr'măl* [L. *trans*, across, beyond; Eng. *normal*]: expressing something in excess of the normal or usual state, or beyond it; not normal in character.

TRANSOM, n. *trăn'sŏm* [L. *trans*, across; F. *sommier*, a sumpter-horse, the piece of timber called a summer (see SUMPTER: SUMMER 2): also derived by some from L. *transenna*, a rope, a noose, or from L. *transtrum*, a cross-beam, transom]: in a *ship*, a beam or timber fixed across the stern-post to strengthen the after-part and give it form: in *arch.*, a horizontal mullion or cross-bar in a window; a lintel over a door, separating it from the fan-light above: in *artillery*, one of the bars which serve to hold together the two sides or 'cheeks' of a gun-carriage: in *surv.*, the vane of a cross staff; a cross-bar of any kind.

TRANSPADANE, a. *trăns-păd'ān* [L. *trænspadanus*—from *trans*, across, beyond; *Padus*, the river Po—from *Padanus*, of or belonging to the Po]: beyond the Po, as viewed from Rome. TRANSPADANE REPUBLIC: see CISALPINE.

TRANSPARENT, a. *trăns-păr'ĕnt* [F. *transparent*—from L. *trans*, through; *parens* or *paren'tem*, appearing; *parērĕ*, to appear: Sp. *transparente*]: that may be seen through; clear; limpid; opposite of *opaque*. TRANSPAR'ENTLY, ad. *-lĭ*, so clearly as to be seen through. TRANSPAR'ENTNESS, n. *-nĕs*, quality of being transparent. TRANSPARENCE, n. *trăns-păr'ĕns*, or TRANSPAR'ENCY, n. *-ĕn-sĭ*, that property of bodies which permits light to pass through them so freely that the forms, hues, and distances of objects can be distinctly seen through them; a picture painted on a semi-transparent material, and which may be seen by light passing through it; a positive photographic picture on glass, intended to be viewed by transmitted light; a slide for a magic-lantern or stereopticon.—SYN. of 'transparent': clear; pellucid; lucid; bright; limpid; diaphanous.

TRANSPICUOUS, a. *trăn'spĭk-ū-ŭs* [L. *transpicĭō*, I look or see through—from *trans*, across; *specĭō*, I see]: transparent; that can be seen through.

TRANSPIERCE, v. *trăns-pērs'* [L. *trans*, through; Eng. *pierce*]: to pass through; to penetrate; to permeate.

TRANSPIRE, v. *trăn-spīr'* [F. *transpirer*, to transpire—from L. *trans*, through; *spīrārĕ*, to breathe]: to emit through the pores of the skin; to be emitted; to send off in vapor; to pass off in insensible vapor; to escape from secrecy; to become public. TRANSPI'RING, imp. TRANSPIRED', pp. *-spīrd'*. TRANSPI'RABLE, a. *-spī'rā-bl*, that may be emitted through pores. TRANSPIRATION, n. *trăn'spĭ-rā'shŭn* [F.—L.]: the process of passing off through the pores of the skin in the form of vapor.

TRANSPLANT, v. *trăns-plănt'* [F. *transplanter*, to transplant—from L. *trans*, across; *plantārĕ*, to plant (see PLANT)]: to remove and plant in another place; to remove and settle in residence in another place; to remove. TRANSPLANT'ING, imp.: N. the act of removing, as a tree, from one situation to another. TRANSPLANT'ED, pp. TRANSPLANT'ER, n. *-ĕr*, one who transplants; a machine used in the transplanting of trees. TRANS'PLANTA'TION, n. *-tā'shŭn* [F.—L.]: the act of removing into another soil; conveyance, as of a disease.

TRANSPLANT'ING: removal of a growing plant from one situation to another—much practiced with many kinds of cultivated plants, which are started in a hotbed, garden, or nursery, and *planted out*. Many flowers and culinary plants are generally treated in this way, as well as shrubs, and fruit and ornamental trees. It is desirable to have a ball of earth attached to the roots of trees or shrubs, though this is often neglected. It is desirable also to shade and water small plants for a few days after transplanting. Young plants are easily transplanted, as their roots, not having spread far, are raised from the ground without

much injury, and this is the thing of first importance in the operation. At an advanced age, transplanting becomes difficult. No plant can be transplanted with safety when in flower or fruit; even if the plant lives, the flowers or fruit will almost certainly perish. Trees and shrubs ought, if possible, to be transplanted in late autumn or early spring, when vegetation is comparatively inactive.

The soil in which plants or trees are to be placed should be in a fertile condition, and by plowing and harrowing be well prepared for their reception. Small plants, as celery, tomato, and egg-plant, which are usually transplanted, could be grown as well in open land if they were given as much room as is assigned to those which are transplanted, and if they could be started sufficiently early in the season. But with many kinds of plants the latter requisite cannot be secured, and it is necessary to start the seed in hot-beds or cold frames in order to have the plants of sufficient age to produce fruit, or reach maturity, at the time desired. Cloudy days are desirable for transplanting, but if it is necessary to do the work in fair weather, it should be done toward night. Roots should be dipped in water and the plants should be set, in freshly stirred soil, soon after they are taken from the ground. The soil must be pressed firmly around the roots—a rule imperative with shrubs and trees as well as with plants. In transplanting trees it is of great importance to secure good roots, to trim off carefully the ends of all that are broken or mangled, and to cut back the tops in the same proportion as the roots have been curtailed. If not in a good state of fertility the ground should be enriched by well-rotted manure or commercial fertilizer. The holes in which the trees are to be set should be of sufficient size to allow the roots to be spread in their natural condition, and deep enough to have the trunks stand a very little lower than they did in the Nursery (q.v.). The fine surface-soil is to be filled in carefully among the roots, and trodden down as the work proceeds. Tall trees should be supported by tying them to stakes; but it is in many respects very much better to set small rather than large trees. Mulching a circle somewhat larger than that occupied by the roots of the tree is of great advantage, particularly in dry soils. The transplanting of trees from the forest, or open land, is much more difficult than that of trees from the nursery, as the latter have already been removed from the seed-beds in which they were started, and thus have been forced to keep their roots more compact than those of trees which have grown in a single locality. In taking up such trees, care should be given to secure good roots and to leave as much earth on them as possible. If the trees have reached much size, the use of a truck with a hoisting apparatus, made specially for the purpose, will greatly facilitate their removal.

TRANSPLENDENT, a. *trăn-splĕn'dĕnt* [L. *trans,* across, beyond; *splendens* or *splenden'tem,* shining (see SPLENDOR)]: resplendent in the highest degree. TRANSPLEN'DENCY, n. *-dĕn-sĭ,* exceeding splendor.

TRANSPORT, v. *trăns-pōrt'* [F. *transporter*—from L. *transportārĕ,* to convey over—from *trans,* across; *porto,* I carry: It. *transportare*]: to carry over or across; to remove from one place to another; to send or carry into banishment, as a criminal; to hurry or carry away by passion or emotion; to ravish with pleasure or ecstasy. TRANSPORT, n. *trăns'pōrt,* conveyance for baggage and stores; the men, horses, and wagons so employed; a ship employed by government in conveying troops, munitions of war, stores, etc.; rapture; ecstasy; a violent manifestation of anger or rage; an old name in Great Britain and her colonies for a convict sentenced to be carried beyond the seas. TRANSPORT'ING, imp.: ADJ. bearing away the soul with pleasure; ravishing with delight. TRANSPORT'INGLY, ad. *-lĭ.* TRANSPORT'ED, pp. conveyed; ravished with delight. TRANSPORT'ABLE, a. *-ă-bl* [F.—L.]: that may be removed or transported; incurring transportation. TRANSPORT'ABIL'ITY, n. *-ă-bĭl'ĭ-tĭ,* state of being transportable. TRANSPORTATION, n. *trăns'pōr-tā'-shŭn* [F.—L.]: the act of carrying or conveying from one place to another; conveyance; carriage; banishment for crime. TRANSPORT'AL, n. *-ăl,* the act of removing from one place to another. TRANSPORT'EDLY, ad. *-lĭ.* TRANSPORT'ER, n. *-ĕr,* one who transports. TRANSPORT'ANCE, n. *-ăns,* in *OE.,* conveyance; carriage; transportation.

TRANS'PORT, MILITARY AND NAVAL: conveyance for troops, horses, wagons, equipment, ammunition, stores, etc.—including the animals and men, also the ships, employed in conveyance. An army is helpless without a powerful system of transport. To cross a sea, a large fleet is requisite with accommodations for horses, artillery, etc. Equally important is the transport to the army moving by land. On entering battle, infantry and cavalry usually carry three days' rations with them, and perhaps 60 rounds of ammunition. The moment these are exhausted, they become dependent on the transport department for their replenishment. The first reserves are immediately in rear. To bring up supplies from these, and to keep these reserves themselves supplied, is the duty of the commissariat department as regards food, and of the field-train as regards ammunition. Between the grand depot and the base, the operation is generally intrusted to the wagons and beasts of the country, driven by natives, of course under proper military control. The amount of transport requisite for a large army seems almost incredible: the lowest computation (if animal transport is used) must put one animal to four fighting-men. In addition to the transport of food and ammunition, the wounded and sick have to be carried, both from the field to the hospitals and during a march.

TRANSPORTA'TION, PENAL: removal of criminals from one territory to another. In Great Britain T. means usually removal beyond seas, as a punishment. The practice was known to the Romans; and T. to Sicily is referred to in Cicero's charges against Verres. The legal T. of criminals began in Great Britain early in the 17th c., when convicts were sent to the Plantations in America. This practice continued, under modifications, until it was ended by the American revolution. When this method of riddance of convicts ceased, there was great alarm lest the British islands would be overrun with crime; and it was hailed as a deliverance when the govt. established a penal colony in Australia. The first convicts were conveyed thither 1787, which was the beginning of the famous colony of Sydney, or Botany Bay (q.v.). The system was at its height 1820–30; but though thousands were annually removed, crime did not decrease. It was forgotten that the predatory and fraudulent offenses are a sort of business as well as crime; and that the place of criminals removed is immediately supplied. When the criminals were sent to the antipodes, it was mistakenly supposed that they took the crime of the country with them, and that there was so much less need for precautionary measures at home. Now, for many years, the greater proportion of the class of criminals formerly transported have been retained in Brit. prisons, and liberated at the end of their punishment. This practice has been accompanied with two classes of precautionary measures—an improved police, and the reformation of juvenile delinquents; and the result has been that crime is diminished to the extent of between a third and a half. On the criminals themselves the effect of T. was proved to be hopelessly demoralizing; and in 1840 T. to New South Wales came to an end as a result of a report on the subject by a committee of the house of commons; and by a succession of statutes, sentences to penal servitude (q.v.) were substituted for sentences to T. In 1868 T. to W. Australia also wholly ceased, to the great benefit of that whole continent. Russia sends political prisoners to the desolate region of Siberia; and the practice began in France just as it was being abandoned by Great Britain.—See CONVICT: TICKET OF LEAVE: PRISONS—PRISON DISCIPLINE.

TRANSPOSE, v. *trăns-pōz'* [F. *transposer*—from L. *trans;* F. *poser*, to place: L. *transpositus*, placed across—from *trans*, across; *positus*, pp. of *ponĕrĕ*, to place]: to change the place or order of by putting one in the place of the other; in *alg.*, to change a term from one side of an equation to the other by changing the sign; in *gram.*, to change the natural order of words or letters; in *music*, to change the key; to write, sing, or play a piece of music in a different key: in *OE.*, to put out of the place; to remove. TRANSPO'SING, imp. TRANSPOSED', pp. *-pōzd'*. TRANSPO'SER, n. *-zĕr*, one who transposes. TRANSPO'SAL, n. *-zăl*, a change of place or order. TRANSPOSITION, n. *trăns'pō-zĭsh'ŭn* [F.—L.]: the changing the places of words or things; the state of being transposed or put out of one

place into another; in *gram.*, a change in the natural order of words or letters; in *music*, a change in the key, either in transcription or performance. TRANS'POSI'TIONAL, a. *-ŭn-al*, pertaining to or embracing transposition. TRANSPOSITIVE, a. *trăns-pŏz'ĭ-tĭv*, made by or consisting in transposition. TRANSPOS'ITIVELY, ad. *-lĭ*.

TRANS-SHAPE, v. *trăns-shāp'* [L. *trans*, and Eng. *shape*]: to transform; to change into another shape.

TRANSSHIP: another spelling of TRANSHIP (q.v.).

TRANSUBSTANTIATE, v. *trăn'sŭb-stăn'shĭ-āt* [F. *transsubstantier*, to transubstantiate—from L. *trans*, across or over; *substan'tĭa*, substance]: to change from one substance into another substance. TRAN'SUBSTANTIA'TION, n. *-ā'shŭn*, a changing into another substance; in the *Rom. Cath. Chh.*, the change—believed by Rom. Catholics to be miraculous—in the consecration of the substance of the bread and wine in the Eucharist, into the body and blood of Christ, only the appearance of the bread and wine remaining. TRAN'SUBSTAN'TIATOR, n. *-shĭ-ā-tĕr*, one who believes in transubstantiation. TRAN'SUBSTAN'TIAL, a. *-shăl*, having passed from its original nature, essence, or substance; relating to transubstantiation.

TRANSUBSTANTIA'TION: literally, 'change of substance,' term used by the scholastic writers of the Rom. Cath. Church to designate the change believed to take place in the Eucharistic elements of bread and wine, in virtue of the consecration. Under the term REAL PRESENCE (q.v.), often loosely comprehended under the larger name of T., the Rom. Cath. doctrine as to the presence of the body and blood of Christ in the Eucharist, after consecration, is set forth. There remains, however, a further inquiry concerning the elements of bread and wine which had existed in their natural condition before the consecration. For Sacramentarians (q.v.), this question is easily resolved. But those Protestants who hold in common with Rom. Catholics the reality of Christ's presence, differ from them as to the co-presence of the substance of bread and wine after consecration. Some Anglican divines, who hold the real presence of Christ's body and blood, appear to content themselves with remaining silent as to the mode of the presence. Dr. Pusey goes so far as to say, that the dispute on this point between Anglicans and Catholics is 'probably a dispute about words' (*Eirenicon*, 229). For the Lutheran views as to the mode of the presence, see IMPANATION: REAL PRESENCE. According to the Rom. Cath. doctrine, which has been explicitly defined as an article of faith (Council of Trent, Sess. xiii. Can. 2), 'the whole substance of the bread is changed into the body of Christ, and the whole substance of the wine into His blood, the species alone remaining.' What is the precise philosophical meaning of the word 'species,' called also 'accidents,' in this definition, is not declared; but in popular language it may be described as meaning the appearances, i.e., those qualities or conditions of bread and wine which produce on the senses the impression of the pres-

ence of bread and wine. It is not taught, however, that in the change called transubstantiation, the body and blood of Christ are formed out of the substance of the bread and wine, but that, in virtue of the Eucharistic consecration, the substance of bread and wine ceases to exist, and that the body and blood of Christ take their place nor that the body and blood of Christ become what the schoolmen call the 'subject' of the 'accidents' of the bread and wine, but merely that, by a miraculous suspension of the ordinary law, the senses still continue to receive from the Eucharistic elements all the same impressions which they had previously received from the bread and wine. The objections to the doctrine have been drawn chiefly from the philosophical difficulties involved in it; and the defenders of it have mostly contented themselves with resting on the proofs which they draw from Scripture and tradition, and a general demonstration that the doctrine, though mysterious, does not involve any philosophical repugnance or impossibility, and that the philosophical arguments against it are at the least not conclusive. Some Roman Catholic philosophers have even undertaken to demonstrate the possibility of transubstantiation by philosophical arguments; and it is especially remarkable that the celebrated Leibnitz not only entered at great length, and in several portions of his works, into this philosophical discussion, but professed to prove, by strict philosophical principles—by consideration of the properties of matter, of substance, of space, of extension, and the like—that the essential principle of the body 'may exist in many places at the same time, nay, under far-distant and distinct species.'

TRANSUDE, v. *trăn-sūd'* [F. *transsuder,* to transude—from L. *trans,* through; *sudo,* I sweat]: to ooze or pass through the pores or interstices of a membrane or substance. TRANSU'DING, imp. TRANSU'DED, pp. TRANSUDATION, n. *trăn'sū-dā'shŭn,* the oozing of fluids or vapors through porous bodies. TRANSU'DATORY, a. *-dă-tėr-ĭ,* passing, as vapors, or fluids, through porous bodies.

TRANSVAAL', THE. See SOUTH AFRICAN REPUBLIC.

TRANSVERSE, a. *trăns-vėrs'* [L. *transversus,* turned across, lying across—from *trans,* across; *versus,* pp. of *verto,* I turn]: lying or being across; running in a cross direction; cross; crosswise: in *bot.,* at right angles with the valves: N. that which crosses or lies in a cross direction: V. to alter; to overturn. TRANSVERSE'LY, ad. *-lĭ.* TRANSVER'SAL, n. *-vėr'săl* [F.—L.]: in *geom.,* a line which traverses or intersects a number of other lines: ADJ. running or lying across. TRANSVER'SALLY, ad. *-lĭ.*

TRANSVERSAL: in Geometry: a straight line that cuts a given set of straight lines. If four lines lie in a plane, all their transversals are divided in the same anharmonic ratio (see PROJECTIVE GEOMETRY). Four lines in space may have no transversals, or they may have one, two, or an infinite number. In the last case the four lines lie on a quadric surface.

TRANSYLVANIA, *trăn-sĭl-vā'nĭ-a* (called by the Hungarians *Erdély-Orszag*—Walach, *Arjal*—'the woody and mountainous country;' by the Germans *Siebenbürgen*, 'seven castles,' from the seven forts built by the Saxons which became nuclei of cities; and by the Romans *Transylvania*, from its position *beyond* the forest range which stretches s. from the Carpathians, and forms its w. boundary): principality, the most easterly territory of Austria, and since 1868 completely incorporated with Hungary, of which it now forms the e. portion. Area 21,518 sq. m. Pop. (1894) 2,247,049, of whom 55 per cent. were Roumanians, 29 per cent. Magyars and Szeklers, 10 per cent. Germans, and 50,000 Gypsies, the rest being Slavs, Armenians, Jews, and Italians. According to religious faith, the Greek Orientals number 32 per cent.; Greek Cath. 27 per cent.; Calvinists 14 per cent.; Rom. Cath. 12 per cent.; Luth. 10 per cent. T. is an elevated plateau (its lowest parts 530 ft. above sea-level) of irregular form, somewhat resembling a triangle of which the upper part has been irregularly removed; and is bounded partially on the n., and wholly on the e. and s., by a high range of mountains—continuation of the Carpathians—which sends out innumerable lateral ridges toward the centre of the country, and along the w. frontier; so that T. is an almost perfect natural fortress. There are no plains except where a river basin widens out; but the valleys are numerous and exceedingly picturesque. Almost the whole country is drained w. into the Danube, by the Theiss and its feeders in the n., and by the Maros, tributary of the Theiss, and its feeders, in the centre and s.; the s.e. corner is drained by the Aluta, or Alt, which, after a winding course, breaks through the s. bounding range near Hermannstadt; while a number of streamlets wind their way through the e. range, and join the Sereth. The climate is more healthful and temperate than that of Hungary, the mountain-chain along the s. frontier keeping off the hot winds. The soil is extremely fertile; but much arable land is still uncultivated. The valleys and hillsides give abundant pasturage to numerous herds of cattle and droves of horses; the cultivated districts yield good crops of maize, rye, barley, oats, all sorts of leguminous plants, tobacco, saffron, madder, hemp, and lint. Culture of fruits is extensive, and immense quantities of apricots, peaches, plums, apples, pears, and walnuts are annually produced. The extensive forests, covering nearly 5,300,000 acres, contribute largely to the wealth of the country. The vine is extensively cultivated, and, in spite of defective preparation, the product is excellent in quality. The mineral wealth of T. is great; gold is found more abundantly than silver, and silver than copper; yet there are few gold mines regularly worked, and no thorough investigation of the gold deposits seems to have been made. Iron is abundant at Torockzo, copper at Balan, lead at Rodna; the other minerals are mercury, manganese, antimony, sulphur, arsenic, vitriol, alum, marble, etc. Coal is not absent; but firewood is so abundant and cheap,

that no other combustible has been sought; and even the extensive tracts of peat lie undisturbed. Rock-salt is abundant. T. has almost no manufactures, and the isolation of the country, lack of enterprise, and absence of good roads, have reduced commerce far below a fair proportion to the amount of the country's produce.

Of the various races which now inhabit T., the Walachs, the earliest possessors, though far most numerous, were till recently subordinated to the other races of T.; but since the revolution of 1848–9, have acquired a position in the country which, by all means, honest or dishonest, they are striving to improve; the Magyars entered as conquerors in the 10th c., and still constitute the nobility and gentry of the land; the Saxons were introduced 1143 and 1247 from the Rhenish provinces of Lower Saxony, by Kings Geysa II. and Bela IV. of Hungary, and received special privileges and immunities to induce them to settle in the country, and improve the cultivation of the soil; and the Szeklers, or Szekhelyi, are believed to be descendants of the once formidable Huns. The last three are the dominant races of T., and live apart from each other—the Magyars occupying the w. and centre, the Saxons the s. and n.e., and the Szeklers the s.e. The Magyars, Bulgarians, and Armenians speak the Magyar language as used in Hungary; the Saxons employ Low-German in speaking, and High-German in writing, but with considerable mixture of Magyar in both; the Szeklers speak a Turanian dialect; and the Walachs use their own language intermixed with corrupt Latin.—T. is little noticed in history till the Christian era, when part of it was occupied by the warlike Dacians, soon after whom the Sarmatian tribes of the Jazyges and Carpi settled in it. The conquest of the Dacians by Trajan, however, did not include that of the other two peoples, who proved very troublesome to the Roman settlers along the Danube, till they were conquered by Diocletian, and the Carpi carried away to Pannonia and other districts. In the middle of the 4th c., the Goths overran the country, defeating the Sarmatians in a great battle on the Maros, in which the monarch and the chief of his nobility perished; and they in their turn were forced, in 375, to retire before the Huns and their confederates. The Gepidæ next took possession of T. till their almost complete extirpation 566 by the Lombards and Avars. T. was conquered by the Hungarians about 1000, and was governed by Woivodes till 1526, when the death of the Hungarian monarch at Mohacs prepared the way for union of the two countries under the Woivode, John Zapolya; but the war which thence arose with the Austrians caused their complete severance, and Zapolya's sway was, 1535, confined to T., of which he became sovereign lord, under protection of the Turks. T., on its conquest by the Hungarians, was only partially settled; the e. part constituted a grazing-ground for wandering tribes who had migrated thither. The Saxons were summoned by the Hungarian monarchs to act as a counterpoise to the increasing power of the nobles; and from

similar motives the Burzen land was given to the Teutonic Knights, but the arrogant bearing of those soldiers of the cross soon offended their titular lord, and they were forced to leave the country. The 'golden charter' of King Andrew II. (1224) secured a perfectly free political system to the Saxons, whose 'comes' or chief was, like the head of a clan, both judge and leader, and from whom the only appeal was to the king in person. The firm protection and generous treatment accorded to the Saxons by the Hungarian monarchs were rewarded by steadfast loyalty, and succor in men and money whenever required. During the rest of the 16th c., the country was distracted by the bitter strife between the Rom. Cath. party, supported by Austria, and the Prot. party, allied with the Turks; the Protestants, headed successively by princes of the houses of Zapolya and Bathory, generally maintaining the superiority. The next chief of the Prot. party was the celebrated Botskay, whose successes against Austria extorted from the emperor an acknowledgment of the independence of T. 1606. To him succeeded Bethlem Gabor, determined foe of Rom. Catholicism and Austria, who did important service during the Thirty Years' War. Between his son and successor, Stephen, and Ragotski arose a contest for the crown, in which Ragotski prevailed; but on his death, the civil war was resumed, till the complete rout of the Austrians by the Turks, under Kiupruli, placed the sceptre in the hands of Michael Abaffi, who reigned, till his death 1690, as a vassal of the Porte. The Austrians now again possessed themselves of T., despite heroic resistance; and though Tekeli (q.v.) succeeded for a brief period in rolling back the invaders, the peace of Carlovitz 1699 again put them in possession; and after the death of Michael Abaffi II., 1713, T. was completely incorporated with Hungary. It was erected into a grand principality 1765. During the insurrection 1848, the Hungarians and Szeklers joined the insurgents, and forced T. to reunite with Hungary, despite the opposition of the Saxons; and the Walachs, still little better than a horde of savages, were let loose over the land to burn, plunder, and murder indiscriminately; the prostration of the country being completed in the following year during the bloody conflicts here between Bem and the Russian troops. In the same year, T. was again separated from its turbulent neighbor, and made a crown-land; the portions of it which had (1835) been annexed to Hungary being restored, as well as the Transylvanian Military Frontier, 1851. In 1867 T. was again united with Hungary. It is now a province under the Hungarian crown, officially styled a grand-duchy. See *Transylvania, its Products and its People*, by C. Boner (Lond. 1865).

TRAP, n. *trăp* [AS. *treppe*, a trap: OHG. *trapo*, a snare: It. *trappa*, a trap, a falling door: Sp. *trampa*, a trap: Gael. *drìp*, a snare: imitative of the sharp sound of a falling door]: a machine that shuts suddenly or with a spring, used for taking game or vermin; any device by which men or animals may be caught unawares; a stratagem: in *plumbing*, a contrivance in a waste-pipe, consisting of a U-shaped or double-curved pipe, with or without a valve, used to form a water-seal and thus prevent the upward passage of effluvia; a game, and the instr. used in it; the familiar name for an open carriage on springs; generally, a single-horse carriage, as a gig; *familiarly*, shrewdness; craft; a thief-catcher: V. to catch in a trap; to take by stratagem. TRAP'PING, imp.: ADJ. catching wild animals in traps: N. the art or practice of catching wild animals by traps. TRAPPED, pp. *trăpt*. TRAPPER, n. *trăp'pĕr*, one whose occupation is to catch wild animals by means of traps. TRAP-DOOR, a door in a floor or a roof which shuts close like a valve. TRAP-STAIR, a narrow staircase or ladder leading up to a trap-door. UP TO TRAP, in *slang*, very knowing; up to snuff.

TRAP, v. *trăp* [F. *drap*, cloth: Sp. and Port. *trapo*, a cloth, rag: origin uncertain]: to deck; to adorn; to ornament with gay dress; to furnish with trappings (see TRAPPINGS and TRAPS, from the same root).

TRAP, n. *trăp*, or TRAP-ROCK [Sw. *trappa;* Dan. *trappe*, a stair: Dut. *trap*, step, degree—so called from the step-like or terraced aspect of the hills in which they occur]: in *geol.*, general term designating all the igneous rocks of various epochs down to the comparatively recent, distinct from the granites on the one hand, and the recent volcanic rocks on the other; a term embracing basalt, clinkstone, greenstone, compact felspar, hornstone, pitchstone, claystone, amygdaloid, trap-tuff, wacke, and the like. TRAPPEAN, a. *trăp'pē-ăn*, or TRAP, a. pert. to the trap-rocks; of the nature of trap. TRAPPOUS, a. *trăp'pŭs*, pert. to or resembling trap; partaking of the qualities of trap. TRAP'PY, a. *-pĭ*, resembling or composed of trap. TRAP-TUFF, n. *-tŭf*, or TRAP-TUFA, *-tū'fă*, a sandstone formed of the earthy rubbings from trap-rocks.—*Trap*, or *Trap-rocks* are an important section of the intrusive rocks, igneous or otherwise, associated with strata of all ages down to comparatively recent. They are so called because, having resisted, from their greater hardness, the abrading influences which have destroyed the softer sedimentary strata, they stand out in some places like huge steps on the faces of the hills and mountains. Unlike granite, the trap-rocks are free from silica, crystallizing as a separate constituent of the rock; from the modern volcanic rocks the structural difference is very slight. The dolerite variety, composed of labradorite-felspar and augite, is largely displayed in the Palisades of the Hudson river and the Mt. Holyoke range of hills, which are great dikes from which the lateral adjacent strata have been worn away.

Trap-rocks sometimes have a dull green color, from which they derive the old name greenstone, a translation of

the German *grünstein*. It has been shown by Delesse that many trappean rocks owe their color to a dark variety of felspar which exists in them. Some greenstones are very light green, others are so dark as to appear black, and all intermediate shades of color occur. These rocks vary also very greatly in texture: in some, the crystals are sufficiently large to be detected with the naked eye; while others are so fine-grained and compact that it is difficult to resolve the separate crystals even with the help of a lens. Experiments have shown that the size of the crystal in an igneous rock increases in proportion to the length of time during which the mass remains fluid, and so permits the continued crystalline segregation of its various ingredients. The same is true in the artificial crystallization of common salt. The vitreous trap and obsidian would accordingly represent a speedily cooled flow of liquid rock. When the crystals are extremely minute, and there is a tendency in the rock to become columnar, it is a basalt. If the felspar is a soda-felspar, either albite or oligoclase, it is diorite; and this kind of rock may be seen to advantage at Marlborough, Mass., in place; n. of New York in large bowlders of a black appearance; and in many other localities. Euphotide, diallage rock, or gabbro, is a compound of Labrador felspar and diallage, a variety of hornblende; it is a coarse, or sometimes fine-grained rock, with granitic or porphyritic aspect. Hypersthene rock, or hyperite, is made up of Labrador felspar and hypersthene, another variety of hornblende; it is also a granitic-looking rock, very tough, and of grayish or greenish-black color: it is very abundant in the Isle of Skye. Distinction in varieties of hornblendic trap is based on the structure of the rock, as well as on its chemical composition. Trappean obsidian is occasionally found. Porphyritic trap is more abundant; a very black variety has received the name metaphyre. Amygdaloid is a trap with round or almond-shaped cavities, filled with agate, calcite, or other minerals, scattered through it. Trap-tuff consists of fragments of scoriæ, volcanic dust, and pieces of other rocks, forming a coarse irregular mass, sometimes bound together by a calcareous cement.

When the silica is in greater proportion than the felspar, it is called petrosilex: it is very compact, homogeneous, with flinty appearance. It forms a large proportion of the contemporary intruded trap-rocks in the Silurian measures of Wales. On the beaches s. of Boston, especially at Cohasset, petrosilex, in the shape of water-worn cobble-stones, abounds in all colors, and the most of it porphyritic. Clinkstone, or phonolite, is a variety found in layers or slabs which give a metallic ring when struck with the hammer. Aphanite, or cornean, scarcely differs from true felstone, except that it is more compact and tougher Pitchstone, or retinite, is a vitreous felstone, less glassy than obsidian, and of green color and resinous lustre. When distinct crystals of one or more minerals are scattered through an earthy or compact base of felstone, a felspathic porphyry is formed. The ancient red porphyry of

Egypt, known as *rosso antico,* belongs to this set of rocks; it consists of a red felspathic base, in which are dispersed rose-colored crystals of oligoclase, with some plates of blackish hornblende and grains of oxidized iron-ore. The antique green porphyry has a very dark green felspathic mass, with light green or white crystals of felspar.

It is to be noted that the material of dikes may have come up in a wet and pasty state, not igneous necessarily; also that some of the varieties of so-called igneous rock are simply metamorphosed strata of rocks originally sediments.

TRAPA, *trăp'a:* genus of plants, of nat. order *Haloragiaceæ,* having a 4-parted calyx, a 4-petalous corolla, and a nut on which the altered calyx appears in the form of spines; the cotyledons very unequal in size. All the species are aquatic, with floating habit. *T. natans,* the WATER CALTROPS, is the only European species. It is found in ditches and ponds in s. Europe, and is grown in ponds in Holland. The floating leaves are rhomboidal, toothed, and smooth; those under water are cut into capillary segments. The fruit has four spines; the kernels are large and almond-like. They are good as food, either raw or roasted, and somewhat resemble chestnuts in taste. They are often used in soups. The French name is *Marron d'Eau* (Water Chestnut).—*T. bispinosa,* the SINGHARA NUT, affords a great part of the food of the inhabitants of Cashmere, and a tax on it by Runjeet Singh yielded a large sum annually.—*T. bicornis* is much cultivated in China, where the cultivation of acquatic plants is carried to a degree unknown in other parts of the world. Its fruit, much used for food, has a marvelous resemblance to a buffalo's head; the horns, the tuft of hair on the crown, the eye-cavities, and the nose are there in miniature.

TRAPAN, v. *tră-păn'* [from TRAP 1 (q.v.)]: to catch by stratagem (see TREPAN 2, which is now the usual spelling): N. a trap; a snare.

TRAPANI, *trâ'pâ-nē* (anc. *Drepănum*): one of the principal seaports of Sicily, on Cape Trapani, on the extreme n.w. coast of the island; capital of the province of Trepani, 40 m. w. of Palermo. The town is walled and defended by a fortress. The streets are wide, and well paved with flagstones. There is a natural harbor, admitting vessels of about 300 tons; a handsome town-house; a tower built by the Saracens; a cathedral; and many churches, some containing fine paintings. The inhabitants are engaged in the tunny, anchovy, and coral fisheries. The coral is brought from the coast of Barbary to Trepani to be cut and polished for exportation. Trepani is a busy town, and exports sumach, salt, soda, coral, alabaster, wine, tunny, and anchovies.—Pop. (1901) 59,452.

TRAP-DOOR SPIDERS: large hairy theraphosid spiders of the family *Ctenitzidæ* and its allies, which inhabit dry warm countries, and form well-like pits or burrows in the ground, closed by a hinged lid. These burrows are placed in high, well-drained situations and are dug by the owners, who cut down and carry away the earth in their jaws, depositing it at some distance. The holes vary in size with the species and age of the occupant, and the largest may be more than a foot deep. In some species wells have a branch burrow slanting from one side, and others make two entrances, so that a plan of the burrow would resemble a Y. These burrows are lined with a coating of silk, and in every case the entrance (or entrances) is closed by a tight-fitting circular door composed of clay, bound and lined with silk, and hinged at one side to the lining of the burrow; the top of the door is left rough and earthy, so that when it is closed nothing betrays the presence of such a contrivance. In the species of the south of Europe the lining and door are much thinner than those made by the American trap-door spiders.

TRAPE, v. *trāp,* and TRAIPSE, v. *trāps* [Scot. *trype,* to walk in an untidy manner]: in *old* and *prov. Eng.,* to trail or walk along in an untidy manner; to gad about. TRAPES, n. *trāps,* an idle sluttish woman: V. to gad about. TRAPESING, imp.: ADJ. or N. *trāps′ĭng,* gadding or gossiping about, generally applied to slatternly girls and women. TRAPSED, pp. *trāpst.*

TRAPEZIUM, n. *tră-pē′zĭ-ŭm,* or TRAPEZE, n. *tră-pēz′* [L. *trapezĭum*—from Gr. *trapĕzĭŏn,* a small table or counter, dim. of *trapĕz′a,* a table: F. *trapèze*]: in *geom.,* a plane figure contained by four straight lines, no two of which are parallel; a bar fastened to the ends of two suspended ropes on which various feats of agility are performed. TRAPE′ZIUM, n. in *anat.,* one of the small bones of the wrist; plu. TRAPE′ZIA, *-zĭ-ă,* or TRAPE′ZIUMS, *-zĭ-ŭmz.* TRAPE′ZIFORM, a. *-fawrm* [L. *forma,* shape]: having the shape of a trapezium. TRAPE′ZIUS, n. *-ŭs,* in *anat.,* a triangular muscle attached to the shoulder and the spine. TRAPEZOID, n. *trăp′ĕ-zoyd* [Gr. *trapez′ĭŏn,* a trapezium; *eidos,* resemblance]: in *geom.,* a plane figure contained by four straight lines, having two of the opposite sides parallel; in *anat.,* one of the bones of the wrist resembling the *trapezium,* but smaller; plu. TRAP′EZOID′ES, *-zoyd′ēz.* TRAP′EZOID′AL, a. *-ăl,* having the form of a trapezoid. TRAPEZOHEDRON, n. *trăp-ē-zō-hē′drŏn* [Gr. *hedra,* a seat, a base]: a solid figure bounded by twenty-four equal and similar trapeziums.

TRAPPINGS, n. plu. *trăp′pĭngz* [Sp. *trapo,* a cloth, a rag (see TRAP 2)]: ornamental articles of dress; furniture; external and superficial decorations; ornamental housings for horses.

TRAPPIST, n. *trăp'pĭst:* member of an order in the Rom. Cath. Church, noted for extraordinary austerities—named from La *Trappe*, an abbey of the Cistercian order in Normandy, founded in the 12th c. The discipline of this monastery, in common with many others of the more wealthy monastic bodies, especially of those which, by one of the corruptions of the period, were held *in commendam*, had become much relaxed; and in the 17th c. little trace of the ancient religious observance remained. In the first half of that century, the abbey of La Trappe fell, with other ecclesiastical preferments, to the celebrated Armand Jean le Bouthelier de Rancé (q.v.), who undertook 1662 a reform of his monastery, and in the end the establishment of what was equivalent to a new religious order. His firmness and vigor overcame the early violent opposition. He himself, as evidence of complete change of life, entered on a fresh novitiate 1663; and in 1664 made anew the solemn profession, and was reinstalled as abbot; from which date began the new austerities which have characterized the order. The monks were forbidden the use of meat, fish, wine, and eggs. All intercourse with externs was cut off, and the old monastic habit of manual labor was revived. The reform of De Rancé is founded on the principle of perpetual prayer and entire self-abnegation. By the T. rule, the monks are obliged to rise at 2 A.M. for matins in the church, which lasts till 3:30; and after an interval in private devotion, they go at 5:30 to the office of prime, which is followed by a lecture. At 7, they engage in their daily tasks, indoors or out, according to the weather. At 9.30, they return to the choir, for the successive offices of terce, sext, and none; at the close of which they dine on vegetables without butter or oil, and a little fruit. This meal is succeeded by manual labor for two hours, after which each monk occupies an hour in private prayer or reading in his own cell until 4 P.M., when they again assemble in the choir for vespers. The supper consists of bread and water, and after a short interval of repose, is followed by a lecture. At 6, they recite compline in choir, and then spend half an hour in meditation, retiring to rest at 8 o'clock. The bed is a hard straw mattress, with coarse coverlet; and the T. never lays aside his habit, even in sickness, unless the sickness prove extreme. Perpetual silence is prescribed, unless in cases of necessity. The minor practices and observances are devised to remind the monk at every turn of the shortness of life and the rigor of judgment; and the last scene of life is made signal in its austerity by the dying man being laid during his death-agony upon a few handfuls of straw, that he may lay aside on the very brink of the grave even the last fragment of earthly comfort to which the necessities of nature had compelled him to cling.

The reformed order of La Trappe scarcely extended beyond France in its first period. The inmates of La Trappe shared, at the Revolution, the common fate of religious houses in France: they were compelled to quit their monastery; but a number of them found a shelter in Switzerland;

and when driven thence, about 250 of them found refuge eventually, under Czar Paul, in Lithuania and White Russia. Later in the war, small communities obtained footing in Italy, Spain, the United States, England, and even in France. After the Restoration, they resumed, by purchase, possession of their old home at La Trappe, which continues to be the head monastery of the order, and numbers nearly 200 members. In more recent years, they have formed many establishments in Europe; and others with extensive territory annexed, in Ky., Iowa, and other states. Many Trappists, however, were expelled anew from France (1880) under the Ferry laws.—A modification of the T. order, called 'T. Preachers,' was established at Pierre-qui-Bire, near Avallon.—See Gaillardin's *Trappistes; ou l'Ordre de Citeaux au* 19 *Siècle* (Paris 1844).

TRAPS, n. plu. *trăps* [a corruption of TRAPPINGS]: in *familiar language*, articles for dress or ornament easily packed and carried about; belongings; luggage; 'things.'

TRASH, n. *trăsh* [OE. *trash* or *trousse*, clippings of trees: Norw. *trosa*, to make a sound as of breaking, to break to bits: Icel. *tros*, rubbish: comp. OF. *dresche*, brewer's grains]: waste or worthless matter; refuse; in the W. Indies and other sugar-growing regions, the decayed leaves and crushed stems of the sugar-cane; Bagasse (q.v.): a worthless person: V. to free from worthless matter; to lop. TRASH'ING, imp. TRASHED, pp. *trăsht*. TRASHY, a. *trăsh'ĭ*, waste; worthless; rejected. TRASH'INESS, n. *-ĭ-nĕs*, state of being trashy.

TRASH, v. *trăsh* [comp. Gael. *trasd*, athwart]: to hold back or restrain, as by a leash or the like; to clog; to encumber; to thwart or cross one's purpose or intentions: N. a piece of leather, couple, or light weight, put on an overswift hunting-dog to lessen his speed; hence, any hindrance. TRASH'ING, imp. TRASHED, pp. *trăsht*.

TRASIMENUS LACUS, *trăs-ĭ-mē'nŭs lăk'ŭs:* ancient name of an Italian lake (*Lago Trasimeno*, or *Lago di Perugia*), between the towns of Cortona and Perugia; about 10 m. long by 8 broad; greatest depth not more than 30 ft. The lake has no apparent outlet, and the margins are flat and overgrown with reeds. It is surrounded by hills, those on the n. side, extending from Cortona to the lake, being known as the Gualandro Hills—*Montes Cortonenses* of Livy—covered at the present day with oak, vine, and olive plantations. The lake contains three islands.—T. L. is memorable chiefly for the great victory by Hannibal B.C. 217, during the Second Punic War, over the Romans, under their consul, C. Flaminius. Hannibal, leaving Fæsulæ, passed close by the camp of Flaminius at Arretium, laying waste the country as he proceeded in the direction of Rome. This, as the Carthaginian gen. intended, induced the consul to break up his encampment, and follow in pursuit, Hannibal meantime taking a strong position on the hills on the n. side of the lake, along which he was passing. The consul, coming up early next morning, when the whole place was enveloped in mist, saw only the

troops in front on the hill of *Tuoro*, with whom he was preparing to engage, when he found himself surrounded and attacked on all sides. The Carthaginians thus had the Romans completely in their power, and took such advantage of the opportunity, that 16,000 Roman troops are said to have been either massacred or drowned in the lake, Flaminius himself being among the first who fell: 6,000 troops who had forced their way through the enemy, surrendered next day to Maharbal. It is said by both Livy and Pliny that the fury on both sides was so great as to render the combatants unconscious of the shock of an earthquake which occurred during the battle.

TRASKITES, n. plu. *trăsk'īts:* in *chh. hist.*, name formerly given to the Seventh-day Baptists, from John Trask or Traske, who in the 17th c. advocated their opinions.

TRAS-OS-MONTES, *trăs-ōs-mŏn'tĕs* (Beyond the Mountains): province of Portugal, forming the n.e. corner of the country, bounded n. and e. by Spain, s. by the river Douro, and w. by the Portuguese province Minho: 4,275 sq. m. It is in the main a high plateau, with bare mountain masses (Mt. Zinho, 7,445 ft.), broken by deep romantic ravines, wild and picturesque; but the port-wine district, known as the *Alto-Douro*, is very pleasant. Wheat and rye are raised, but the chief products are wine and oil. In several places silkworm cultivation is successful. Fruits, especially oranges, are produced abundantly in the valleys, and sumach on the mountains, which are also rich in unutilized metallic wealth.—Pop. (1881) 396,676.

TRASS, n. *trăs*, or TARRASS, n. *tăr-răs'* [prov. Ger. *trass*—from L. *terra*, earth]: in *geol.*, a tufaceous alluvium or volcanic earth which occupies wide areas in the Eifel district of the Rhine—used, when pulverized, as a hydraulic cement.—*Trass* resembles the Pozzuolana (q.v.) of Naples. It is of pale-yellow or grayish color, is rough to the feel, and consists almost entirely of pumice, in which are imbedded fragments of basalt, burnt shale, slate, sandstone, etc., and even numerous trunks and branches of trees.

TRAUMATIC, a. *traw-măt'ĭk* [Gr. *traumatĭkŏs*, of or for wounds—from Gr. *trauma*, a wound]: arising from wounds or local injury; vulnerary: N. a medicine useful in the cure of wounds. TRAUMAT'ICINE, n. *-ĭ-sĭn* a wound-healer—applied to a preparation of gutta-percha for covering wounds. TRAU'MATISM, n. *-ma-tĭzm*, the condition of the system occasioned by a grave wound.

TRAVAIL, v. *trăv'ĕl* [F. *travail*, pains, work: It. *travaglio;* Sp. *trabajo*, labor, properly a break for vicious horses: W. *trafu*, to stir, to agitate; *traf*, a stir, a strain: derived by some from a supposed mid. L. *travārĕ*, to make with beams, to pen, to shackle, to embarrass—from L. *trabs* or *trabem*, a beam]: to work or labor excessively; to toil; to suffer the pains of childbirth; to disturb greatly: N. labor with pain; the pangs of childbirth. TRAV'AILING, imp.: ADJ. in the pains of childbirth. TRAVAILED, pp. *trăv'ĕld.*

TRAVANCORE, *trăv-an-kōr':* protected state in the extreme s. of India; bounded e. by the states of Tinnevelli and Madura, w. by the Indian Ocean; 6,730 sq. m. At the s. extremity of the state is Cape Comorin (properly, Kumarin). On the elevations the soil is light and gravelly; in the valleys it is in general a deep black mold. Rice, the sago-palm, and vegetables are principal products. Formerly, the cap. was Travancore, a decayed and unimportant town; the present cap. is the small town Trivanderam.—P. of state (1881) 2,401,158; (1901) 2,952,157.

TRAVE, n. *trāv*, or TRAVIS, n. *trăv'ĭs* [OF. *traf;* It. *trave*, a beam, a large piece of timber—from L. *trabs* or *trabem*, a beam]: a wooden frame to confine an unruly horse while being shod; in *OE.*, a beam or a lay of joists. TRAV'IS, n., or TRAV'ISES, n. plu. *-ĭ-sēz*, in a *byre* or *stable*, a low separating division or partition between the stalls for the animals, made of flags of stone set upright.

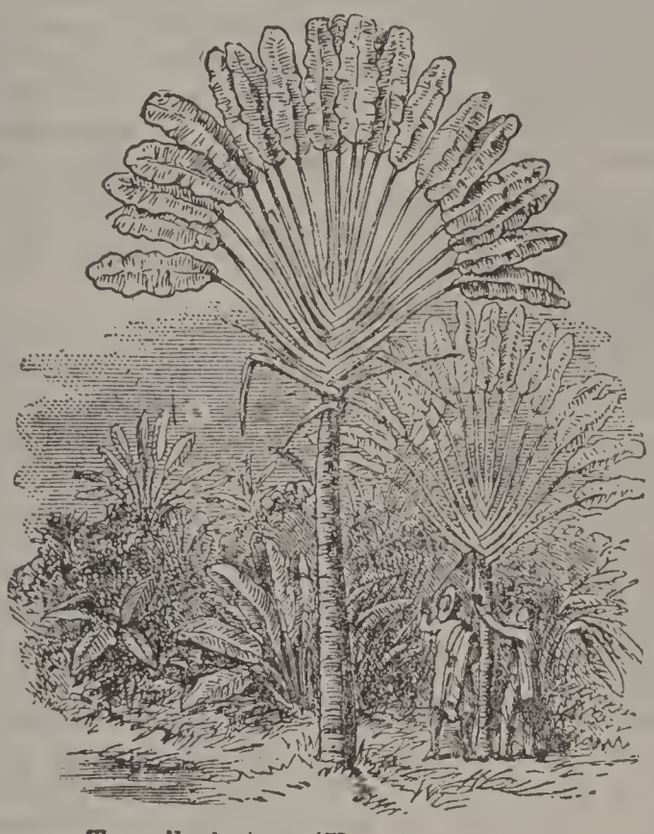
TRAVEL, v. *trăv'ĕl* [a different spelling and application of *travail:* It. *travaglio;* Sp. *trabajo;* F. *travail*, properly a drag for horses, then pains, labor, work: W. *trafu*, to stir, to agitate (but see also TRAVAIL)]: to pass through; to journey over; to go a march on foot; to pass to a distant place or country; to visit various parts of the world by sea or by land; to visit various places, as the agent of a wholesale house, to effect the sale of goods among retailers; to pass, as, time *travels:* N. a passing from one place to another; a journeying to or through a country; in *OE.*, for TRAVAIL, labor in childbirth. TRAV'ELLING, imp. walking; going: ADJ. pertaining to travel; itinerant; moving; movable: N. a passing through a country or countries. TRAV'ELLED, pp. *-ĕld:* ADJ. having made journeys. TRAV'ELS, n. plu. *-ĕlz*, an account of things seen, with observations thereon, during a journey or journeys; the journeys themselves, as, he has returned from his *travels.* TRAV'ELLER, n. *-ĕl-lĕr*, one who is travelling, or who has travelled, in distant countries; a wayfarer; an agent of a wholesale house who travels from one place to another to effect the sale of goods among retailers or manufacturers: among *seamen*, a ring or hoop that slides along a rope or boom. TRAVELLER'S-JOY, the shrub *Clemătis; C. Vital'ba*, ord. *Ranun'cŭlācĕæ.* TRAVEL-STAINED, a. having the clothes soiled through travel. TRAVEL-TAINTED, in *OE.*, fatigued with travel; harassed.

TRAVELLERS, Law as to: the law affecting passengers by land, in a carriage or public conveyance, may be stated as follows: The owners of the railroad or other carriage do not contract to carry the passenger with perfect safety; they do not warrant that he will not be injured; they contract merely to carry him without any negligence on their part. Hence, in case of accident, though it is not strictly correct in law to assume that the accident arose from some negligence of the carrier unless there is evidence for this, this presumption is in fact made, and it lies on the carrier to show that it was from no fault or negligence on his part that the accident happened. As questions of negligence must almost always be decided by a jury, and their prepossessions are against admitting the idea that accidents arise from any cause except negligence of the carrier—in the main a wholesome doctrine—a railroad or public company seldom attempts to dispute their responsibility on that ground. The rule is that a railroad company is responsible for the negligence of any of their servants; hence, in case of accidents, all passengers injured—and in case of death the parent, husband, wife, or children of the deceased passenger—commonly make a claim of compensation, except when the accident was evidently due to the passenger's own negligence. For the passenger is bound to take ordinary care of himself, avoiding rashness or foolishness which might lead to an accident. Railroad companies are not bound to carry everybody who comes, but merely to give reasonable accommodation to the ordinary number, otherwise their liability would be enormous on particular occasions where crowds assemble. Their interest is usually a sufficient inducement on such occasions to provide the accommodation required. A passenger has a right to carry with him Luggage (q.v.).

In the case of passengers by sea or by inland water-routes, a peculiar code has been constructed, owing to the peculiarity of their situation. Thus, an act of congress (*Revised Statutes*, § 4252) fixes the number of passengers that may be taken on board any vessel; the space allowed to each passenger; and makes many special regulations for the safety and comfort of passengers, too minute to be enumerated here.

TRAVELLER'S-TREE (*Urania speciosa*, or *Ravenala Madagascariensis*): remarkable plant of nat. order *Musaceæ*, native of Madagascar, and forming a characteristic feature of the scenery of many parts of that island. The stem resembles that of the plantain, but sends out leaves on only two opposite sides, like a great expanded fan. The lower leaves drop off as the stem grows, and in an old tree the lowest leaves are sometimes 30 ft. from the ground. A tree often has 20 or 24 leaves, the stalk of each leaf being 6 or 8 ft. long, and the blade 4 or 6 ft. more. The blade of the leaf is oblong, bright green, and shining. The fruit is not succulent, but is filled with a fine silky fibre of brilliant blue or purple color, among which are 30 or 40 seeds. 40 or 50 fruits grow in a bunch, and three or four bunches may be seen at once on the tree. The leaves

are much used for thatch, and for many other purposes; and the leaf-stalks for the partitions, and often even for the walls of houses. The leaf-stalks always contain water, even in the driest weather—more than a quart being read-



Traveller's-tree (*Urania speciosa*).

ily obtained by piercing the thick part of the base of a leaf-stalk; and this water is pure and pleasant: hence the name *Traveller's-tree.*

TRA'VEMÜNDE: see LÜBECK.

TRAVERS, ad. *trăv'ĕrs* [see TRAVERSE]: athwart; across.

TRAVERSE, a. *trăv'ĕrs* [OF. *travers,* across—from L. *transversus,* turned across—from *trans,* across; *versus,* pp. of *verto,* I turn: It. *traversa;* F. *traverse,* a cross-beam of timber]: lying across; in a direction across something else; transverse; crosswise; athwart: N. anything laid or built across; anything that thwarts or crosses; an unlucky accident: in *fort.,* a parapet and trench across a ditch—a detached parapet and trench on the flank of any work to protect the defenders from any enfilading fire—generally a parapet with banquette and palisade thrown across the whole width of the covered-way: among *seamen,* the zigzag course made by a vessel compelled to tack: in *arch.,* a gallery or loft of communication in a church or other large building: in *law,* a denial of some matter of fact by the opposite party: V. to place in a cross direction; to thwart; to travel over; to wander over; to pass over and view; to survey or examine thoroughly; to turn and point, as a cannon, in any direction: in *law,* to deny what has been advanced by the opposite party: in *fencing,* to oppose a movement; to turn, as on

a pivot: AD. crosswise; athwart. TRAV'ERSING, imp. passing over; thwarting; denying. TRAV'ERSED, pp. *-ėrst.* TRAV'ERSER, n. *-sėr*, one who opposes a plea in law: in *rail.*, a traverse-table, which see. TRAV'ERSABLE, a. *-săbl*, that may be traversed or crossed; that may be denied. TRAVERSE-SAILING, the case in plane-sailing when the ship makes several courses in succession, the track being zigzag, and the directions of its several parts lying more or less athwart each other. TRAVERSE-TABLE, a table used in 'resolving a traverse' that is, in computing the departure made in traverse-sailing; in *rail.*, a platform with one or more tracks, and arranged to move laterally on wheels for the convenience of shifting carriages, etc.

TRAVERSE CITY, *trăv'ėrss:* city, cap. of Grand Traverse co., Mich.; on Grand Traverse Bay, and on the Grand Rapids and Indiana, the Pere Marquette and the Manistee railroads; 144 m. n. of Grand Rapids. It has an excellent harbor, regular steamboat connection with all Lake Michigan ports, and a considerable trade in agricultural products and lumber. Its manufacturing interests are also of importance; they include flour and lumber mills, wagon factories, and the manufacture of fruit baskets and wooden dishes. T. C. has a public high school, a public library, and a business college. Pop. (1900) 9,407; (1910) 12,115.

TRAV'ERSING PLATFORM: arrangement to facilitate movement of cannon in battery. The gun is mounted either on an ordinary truck-carriage, or on rollers under its trunnions. The truck or rollers work in and out on two parallel iron rails 16 ft. or more in length, mounted on the traversing carriage. Wheels at each end of this platform (or more frequently if the weight of the gun be very great) are placed at right angles to the direction of the rails, and run on circular tramways, which have their centre in the embrasure through which the gun is fired. The rails incline toward the rear, to moderate the gun's recoil. The advantages are that the leverage for turning the gun is increased by the platform's length, while the circular rails diminish the resistance; that the gun is easily run out for firing on the upper rails; that by its own recoil it runs itself in again for loading; and that a much smaller embrasure is required to give a good compass to the muzzle.

TRAVERTINE, n. *trăv'ėr-tĭn* [It. *travertino, tibertino*, travertine: L. *lapis Tiburtīnus*, the stone of *Tibur*—from anc. *Tibur*, the modern Tivoli, near Rome, at which travertine is abundantly formed from the waters of the Anio]: a whitish concretionary limestone deposited from the water of springs holding lime in solution; calcareous tufa or calctuff.

TRAVESTY, v. *trăv'ės-tĭ* [F. *travestir*, to disguise, to travesty—from L. *trans*, across, over; *vestīrĕ*, to clothe—from *vestis*, a garment]: to traslate or parody in such a manner as to render ridiculous or ludicrous; to turn into burlesque: N. a burlesque translation or imitation of a work of a dignified or serious character. TRAV'ESTYING, imp. *-tĭ-ĭng*, turning into ridicule. TRAV'ESTIED, pp. *-tĭd*,

parodied, turned into ridicule.—*Travesty* differs from Parody (q.v.) which changes the subject-matter and the *dramatis personæ*, but mockingly imitates the style of the original, while T. leaves the subject-matter partially, and the *dramatis personæ* wholly, unaltered; producing a purely comic effect by the substitution of the mean, the frivolous, and the grotesque in action or speech, for the serious, the noble, or the heroic.

TRAVIS: see TRAVE.

TRAVNIK, *trav'nĭk:* town of Bosnia (now under Austrian administration), formerly the cap. of Bosnia; on the Lasva river, 45 m. w.n.w. of Bosna-Serai. Its numerous mosques, and the castle, dating from the middle ages, are the principal edifices. The people mostly are Mohammedans. The principal industry is manufacture of sword-blades.—Pop. 12,000.

TRAWL, v. *trawl* [from Eng. *trail;* mid. L. *tragŭla*, a sled—from L. *trahĕrĕ*, to drag]: to fish by trailing or dragging a net sunk in the water behind a boat or vessel: N. a line of very great length, with numerous smaller lines attached, used in haddock-fishing, etc.: the large net used in trawling. TRAWL'ING, imp.: ADJ. dragging a net for fish; using a drag-net: N. the act of dragging for fish with a net; also, in the United States and Canada, trolling, or fishing with a Troll (q.v.). TRAWL'ER, n. *-ĕr*, one who trawls; a small vessel used in fishing with the trawl-net. TRAWL-NET, the large purse-shaped net, about 70 feet long, and with a breadth of 40 feet at the mouth, used by trawlers.

TRAWL'ING: mode of fishing by a net dragged along the bottom of the sea, behind a boat, and much employed in deep sea fishing. The net used, called a *trawl*, *trawl-net*, or *beam-trawl*, is a triangular purse-shaped net, about 70 ft. long, usually about 40 ft. wide at the mouth, and gradually diminishing to 4 or 5 ft. at the beginning of the *cod*, or smaller end of the net, which is about 10 ft. long and of nearly uniform breadth. The upper part of the mouth is secured to a wooden beam about 40 ft. long, which keeps the net open; this beam is supported on two upright iron frames, known as the *trawl-heads* or *irons*. The under side of the net corresponds with the upper, except that instead of being fastened to a beam, it is made with a deeply-curved margin attached to the *ground-rope*, the whole length of it in contact with the ground. A trawl has also generally two *pockets*, one on each side, made by lacing together the upper and under parts, so that fish turning back from the cod may be caught in them. The meshes vary in size from four inches square at the mouth, to an inch and a quarter square in the cod. Two stout ropes, of about 15 fathoms each, are fastened, one to the front of each of the trawl heads, the other ends united to form a bridle, to which is shackled a warp 150 fathoms long. By this warp the trawl is towed, the quantity of rope paid out depending on depth of water, weather, and other conditions. Trawling is generally in the direction of the tide, sometimes across it, never against it. The rate of progress is

usually only from half a mile to two miles an hour faster than that of the stream. The trawl can be used with advantage only on a sandy bottom or other smooth ground: on rough ground, the net would be torn in pieces. The vessels employed in trawling on the Dogger Bank and elsewhere near the British coast vary in size from 35 to 60 tons. Many of these trawlers, however, stay out at sea six weeks at a time in all seasons of the year; their fish being packed in ice collected by fast-sailing cutters, and so conveyed to market. Cod, haddock, and other *white-fish* are caught in great numbers by trawling; and some kinds of flat-fish, as soles, are scarcely to be obtained by any other means. Smaller trawl-nets than those above described are used in bays and estuaries. A *pole-trawl* is a less effective kind of trawl, now little used.—See NETS.

TRAY, n. *trā* [Dut. *draagen*, to carry; *draag-bak*, a hod for carrying mortar]: a very shallow trough employed for a variety of purposes in domestic use; a tin board; a kind of salver or waiter; any similar shallow trough.

TREACHEROUS, a. *trĕch'ėr-ŭs* [F. *tricherie*, trickery; *tricher*, to cheat: Dut. *trekken*, to draw, pull; *trek*, a trick (see TRICK)]: faithless; perfidious; traitorous to the state or sovereign; betraying a trust; not to be relied on. TREACH'EROUSLY, ad. *-li*. TREACH'EROUSNESS, n. *-nĕs*, treacherous character. TREACH'ERY, n. *-i*, betrayal of trust; violation of faith and confidence; violation of allegiance; perfidy. TREACH'ER, n. *-ėr*, or TREACH'OUR, n. *-ėr*, or TREACH'ETOUR, n. *-ĕ-tėr*, in *OE.*, a traitor; a trickster.—SYN. of 'treacherous': perfidious; false; plotting; insidious; traitorous; treasonable; illusory.

TREACLE, n. *trē'kl* [OF. *triacle*, an old confection, considered a sovereign remedy against poison—from L. *thēriācus;* Gr. *thērĭākŏs*, good against the poison of animals, especially the bite of serpents—from Gr. *thērĭŏn*, a wild animal]: *formerly*, a preparation believed to be an antidote to poison, especially to poison resulting from the bite of a viper (see THERIACA): the liquid left during the process of granulating raw sugar; Molasses (q.v.); a saccharine fluid obtained from the juices of certain vegetables.

TREAD, v. *trĕd* [AS. *tredan;* Ger. *treten;* Dut. *treden;* Dan. *træde;* Icel. *troda;* Goth. *trudan*, to tread: W. *troed;* Gael. *troidh*, the foot]: to step or walk on; to beat or press under the foot; to trample in contempt or hatred; to copulate, as cock-birds; to set in motion with the feet; to walk or go; to walk with form or state; to dance, as to *tread* a measure. N. mode of stepping; copulation, as of birds; the part of a step on which the foot is placed; the bearing part of the outer rim of a wheel; the part of a fortification behind the parapet, on which soldiers stand to fire; the width of a bicycle from pedal to pedal: in *OE.*, place trod on or used in stepping; way; track. TREAD'ING, imp. pressing with the foot: N. act of pressing with the foot; a walking; a stepping; in *OE.*, way, track, or path. TROD, pt. *trŏd*. TROD, or TRODDEN, pp *trŏd'n*. TREAD'ER, n. *-ėr*, one who or that which treads. TREAD-MILL, machine worked by a

man or by a number of men or by an animal treading continously on the steps of a cylinder, used sometimes in productive labor, as in grinding corn, sawing stones or timber, etc., but chiefly as an instr. of prison discipline. TREADLE, n. *trĕd l*, a kind of lever acted on by the foot, forming part of many machines, and used in communicating motion to the machine or to some part of it, as the *treadle* of a loom, of a spinning-wheel, a grindstone, a bicycle, or the like; the albuminous cord which unites the yolk of the egg to the white. TREAD OF A BANQUETTE, in *fort.*, the upper surface of a banquette. TREAD OF A LATHE, the upper side of the bed between the head-stock and the back centre.

TREAD-MILL: in Prison Discipline: appliance invented by Sir William Cubit, of Ipswich, England; consisting of a wheel in the form of a long cylinder, furnished with 24 steps round its circumference, and turned on its axis by the tread of prisoners, each of whom may be made to tread in a separate compartment, so boarded off that he can have no intercourse with the others. The prisoners are supported by a hand-rail, and cause the wheel to revolve about twice in the minute. As an instrument of prison discipline, it has been generally supplanted by the *Crank*, a small flaked wheel, like the paddle-wheel of a steamboat which, on the prisoner turning a handle outside, revolves within a box partially filled with gravel. The amount of strength necessary to each revolution can be regulated by the quantity of gravel used, and a register placed outside the prisoner's cell records the number of revolutions made. The crank is used only when hard-labor is part of the prisoner's sentence.

TREAD-SOFTLY, n.: in *bot.*, *Cnidoscolus stimulans*, plant of the order *Euphorbiaceæ* growing in the southern states. It has palmately lobed leaves, with spreading hairs, which, when trodden on by the bare feet of the negroes, sting them severely; hence the English name.

TREADWELL, *trĕd'wĕl*, DANIEL: 1791, Oct. 10—1872, Feb. 27; b. Ipswich, Mass.: inventor. While a child he invented a machine for making wooden screws; later inventions were—1818 a new form of printing-press; 1822 a power-press; 1826 a system of turn-outs for single-track railroads; 1829 a machine for spinning hemp; 1835 a method of making cannon from wrought-iron and steel, similar to the later Armstrong gun. With Dr. John Ware he established the *Boston Journal of Philosophy and the Arts*, 1822. He was Rumford prof. in Harvard College 1834–45, and published *The Relations of Science to the Useful Arts* (Boston 1855); *On the Practicability of Constructing a Cannon of Great Calibre* (Cambridge 1856); and *On the Construction of Hooped Cannon* (1864).

TREAGUE, n. *trēg* [Sp. and It. *tregua*, a truce (see TRUCE]: in *OE.*, a truce or cessation of arms.

TREASON, n. *trē'zn* [OF. *traison;* F. *trahison,* treason —from *trahir,* to betray—from L. *tradĕrĕ,* to deliver up, to betray (see also TRAITOR)]: a breach of fidelity; treachery: specifically, a breach of allegiance to the sovereign or state to which one owes allegiance. HIGH TREASON, any crime affecting the safety or dignity of a sovereign or his state. TREA'SONABLE, a. *-ă-bl,* involving or partaking of the crime of treason. TREA'SONABLY, ad. *-ă-blĭ.* TREA'SONABLENESS, n. *-bl-nĕs,* the state or quality of being treasonable. TREA'SONOUS, a. *-ŭs,* in *OE.,* treasonable.—SYN. of 'treasonable': treacherous; traitorous; perfidious; insidious.

TREA'SON: highest civil crime which a member of the community can commit, being treachery against the state or the sovereign.

By the ancient common law of England, there was great latitude as to what was held by the judges to be T., whereby, says Blackstone (b. iv. c. vi.), the creatures of tyrannical princes had opportunity to create abundance of constructive treasons, i.e., to raise, by forced and arbitrary constructions, offenses into the crime and punishment of T., which never were suspected to be such. Thus, the accroaching, or attempting to exercise, royal power—a very uncertain charge—has been treated as T. The injustice involved in the theory of these constructive treasons led to the passing of the statute of 25 Ed. III. c. 2, which attempted to define T., in five forms here summarized. 1. When a man compasses or imagines the death of the king, queen, or their eldest son and heir. The law on this point has often been strained, and in arbitrary reigns, even a sermon unpreached was held to convict Peachum; and a paper found in a closet, to convict Algernon Sidney, though merely speculative in its character. 2. Violating of the king's wife, or his eldest daughter unmarried, or the wife of the king's eldest son and heir. 3. Levying war against the king in his realm, either by taking arms to dethrone the king, or under pretense to reform religion or the laws; by resisting the king's forces; by joining an insurrection, with avowed design to pull down all inclosures, all brothels, and the like; though such a conspiracy, if aimed at a particular house, would be only a riot. 4. Adhering to the king's enemies in the realm by giving them any aid and comfort. 5. Lastly, slaying the chancellor, treasurer, or the king's justices of the bench, or in assize, while in their places administering justice. Between the reigns of Henry IV. and Queen Mary, the courts returned to the system of inventing constructive treasons, and actually included as such the clipping of money, burning houses to extort money, refusing to abjure the pope, etc. These and other new-fangled treasons were totally abolished by a statute of 1 Ed. VI. c. 12. By subsequent statute some other forms of T. have been indicated; and by 36 Geo. III. c. 7, whoever compasses or intends death or bodily harm to the person of the king, is to be adjudged a traitor. Some safeguards for the accused were provided by a statute of William III.—The punishment of T. formerly was severe and even barbarous. The traitor was to

be drawn on a hurdle to the place of execution, hanged by the neck, his head then severed from the body, the body divided into four quarters; and the head and quarters to be at the disposal of the crown. But 1870 these barbarities were repealed, and the sentence is now changed into hanging. The consequence of a conviction of T. formerly was forfeiture and corruption of blood; the corruption of blood having the effect that the attainted person could neither inherit lands from his ancestor, nor transmit them to any heir; but this was altered as regards England and Ireland 1870 (see ATTAINDER). The convict forfeits and is disqualified for any public office; the court may order him to pay the costs of his conviction, and his whole property is transferred to administrators named by the crown, who administer it and retransfer the surplus to his heirs and representatives.

Certain minor offenses, called misprision of treason, are those closely bordering on T.: such are offenses which consist in the bare knowledge and concealment of T., without any degree of assent thereto, for any assent makes the party a principal traitor. The punishment was loss of goods and lands during life. Another offense closely related to T. is that of wilfully pointing a gun at, or attempting to strike, the person of the sovereign, with intent to injure him (or her); the offense being punishable with 3 years' imprisonment. There is also an offense cognate to T., created by 11 and 12 Vict. c. 12—that of intending to depose the queen, or levying war against her in order to intimidate her or the houses of parliament. The offense of Præmunire (q.v.) was originally the introducing a foreign power into the country, and the name was extended to similar offenses.

In the United States, the constitution defines T. to the United States as consisting 'only in levying war against them, or in adhering to their enemies, giving them aid and comfort.' The constitution further declares that 'no person shall be convicted of T. unless on the testimony of two witnesses to the same overt act or on confession in open court.' Further that 'the congress shall have power to declare the punishment of T.; but no attainder of T. shall work corruption of blood, or forfeiture, except during the life of the person attainted' (Art III., sec. 3). T. may be committed also against any of the states of the Union. the punishment of T. is determined by the constitution of each state.

TREASURE, n. *trĕzh'ûr* [OF. *tresor*—from L. *thĕsau'rus;* Gr. *thēsau'ros,* anything laid or stored up: It. *tesoro:* F. *trésor:* the *r* after *t* is intrusive]: a store of money in reserve; riches hoarded; a great store of anything collected for future use; something highly valued: V. to lay up or collect for future use; to hoard; to prize; to store, as in the mind. TREAS'URING, imp. laying up for future use. TREAS'URED, pp. *-ûrd,* laid up for future use; greatly valued. TREAS'URELESS, a. *-ûr-lĕs,* without treasure. TREAS'URER, n. *-ėr,* one who has the charge of the money or funds of a society, corporation, state, etc. TREAS'URER-

SHIP, n. *-shĭp*, the office of treasurer. TREAS'URY, n. *-ĭ*, a place or building in which stores of wealth are deposited; a department of government where the expenditure of the public money is managed; all the officers connected with the department; an abundant store; a repository; in *OE.*, a treasure. TREASURE CITY or HOUSE, *anciently*, a place where treasure was deposited. TREASURE-TROVE, *-trōv* [F. *trouver*, to find]: any money, articles made of gold or silver, or the precious metals in any form, found in the earth or otherwise hidden, the owner of which is not known: in the United Kingdom all such treasure belongs by law to the crown, and the finder is guilty of an indictable offense if he fails to give it up. When given up, the crown pays the finder the full value of the treasure. In the United States the finder of a thing is its lawful custodian if the owner is unknown, and becomes its owner if the original owner cannot be found. TREASURY BOND, a species of Exchequer Bill (q.v.). TREASURY WARRANT, in Britain, official and legal notice issued by the lords of the treasury for public information. LORDS OF THE TREASURY, five state officers who have superintendence of the department for managing public finances of the United Kingdom, the chief of whom is called the first lord of the treasury, and is generally prime minister for the time being—the second being the chancellor of the exchequer, and its practical head. LORD HIGH TREASURER, formerly the third great officer of the crown in England, whose duties are—since the accession of George I.—discharged by the lords commissioners who are known as lords of the treasury. TREASURER OF THE HOUSEHOLD, officer in the lord steward's department of the royal household of the United Kingdom, who ranks next to the lord steward. He is always a member of the privy council.

TREASURY, THE: in the *United Kingdom*, the department of executive government which has control of the revenue and expenditure of the country. The Treasury Board now consists of the prime minister (generally styled first lord of the T.), the chancellor of the exchequer, and three junior lords of the T., who have usually seats in parliament, as have also the two joint-secretaries of the T. The first lord being the head of the administration, his duties are not limited to the T., which is chiefly conducted by the other members of the board. The chancellor of the exchequer, who holds under a distinct patent the office of under-treasurer, is the effective head of the T., exercising the most responsible control over the expenditure of the different branches of the service, as also over all works demanding unusual outlay in the naval, military, and civil departments. He prepares an annual estimate of the expenses of the country, and of the ways and means by which they are proposed to be met; and this statement, known as the Budget, is submitted by him to the house of commons. The prime minister, when a member of the house of commons, has occasionally held at the same time the office of chancellor of the exchequer. The duties of the junior lords are in a great measure formal; the heaviest

portion of the executive functions of the T. devolves on the secretaries.

The function of payment has ever since the Restoration been separated from the custody of the public revenue, the former only being vested in the T., while the latter belongs to the exchequer. By an arrangement effected by 4 and 5 Will. IV. c. 15, the revenue flowing into the T. is paid into the Bank of England, to the credit of the comptroller-gen. of the exchequer, and all payments on public account are made pursuant to a warrant or order of the T. No moneys voted by parliament can be drawn from the exchequer without the warrant of the T. board, nor can any payment be made from the civil list without its authority.

The duties of the T. board are numerous. The supplies for the army, navy, and civil service are issued under its authority; expenses of legal establishments, courts, sheriffs, etc., are subject to its examination. All payments for civil salaries, allowances, and incidental charges payable in England, and all payments for the army, navy, and ordnance, are made on its special authority. The boards of customs and inland revenue, and the post-office, are under its general authority. The expenses of colonial and other offices are controlled by it. The treasury possesses the patronage of the departments immediately subordinate to it.

TREASURY DEPARTMENT, UNITED STATES: one of the chief divisions of the federal executive govt. As its title indicates, the chief concernment of the T. D. is with the public revenues and the public disbursements, but it has control of a multitude of affairs which only indirectly or even not at all touch the question of disbursement and revenue: see SECRETARIES OF EXECUTIVE DEPARTMENTS.

TREAT, v. *trēt* [F. *traiter;* OF. *traicter*, to meddle with, to discourse—from L. *tractārĕ*, to treat, to handle—from *tractus*, pp. of *trahĕrĕ*, to draw]: to handle or manage in a particular manner, as to *treat* a subject exhaustively; to discourse, generally with *of;* to entertain with food or drink without cost to the guests; to behave toward; to manage, as a disease, in the application of remedies; to make and receive proposals with a view to the settlement of a claim, the adjustment of differences, etc.; to negotiate; to come to terms of accommodation; in *chem.*, to subject to the action of; in *OE.*, to entreat: N. an entertainment given as an expression of regard; something which affords much pleasure; unusual gratification. TREAT'ING, imp.: ADJ. using; discoursing on; entertaining: N. act of one who treats; bribery. TREAT'ED, pp. TREAT'ABLE, a. *-ă'bl*, in *OE.*, capable of being treated; moderate; practicable. TREAT'ER, n. *-ẽr*, one who treats. TREAT'MENT, n. *-mĕnt*, management; manner of using; good or bad behavior of some person or thing; manner of applying remedies, as in disease. TREAT'ISE, n. *-ĭz*, a written composition in which the principles of a particular subject are discussed in a formal and methodical manner; a formal

essay. TREAT'Y, n. -*ĭ* [F. *traité*]: negotiation with the view of adjusting differences; a formal agreement; a league or contract between two or more nations. TO TREAT WITH, to negotiate; to propose an adjustment of differences. TO STAND TREAT, to entertain at one's own expense.

TREAT, *trēt*, ROBERT: 1622–1710, July 12; b. England; lawyer. He removed to New England with Sir Richard Saltonstall; was an early settler of Wethersfield and Milford, Conn., and of Newark, N. J.; returned to Milford, Conn., 1672, where he was chosen judge, maj. of militia, and commander-in-chief of the colonial troops for the war with King Philip 1675; and drove the Indians from Northfield and Springfield, routed them in their attack on Haddam, and took part in the battle at Narragansett Fort. T. was deputy-gov. of Conn. 1676–83 and 1698–1708, and gov. 1683–98.

TREATY: in public law, an agreement of friendship, alliance, commerce, navigation, or the like, entered into between two or more independent states. Treaties have been divided by publicists into *personal* and *real;* the former relating exclusively to the persons of the contracting parties, e.g., treaties guaranteeing the throne to a particular sovereign and his family; the latter relating to national objects apart from rulers, and binding the contracting parties independently of any change in the sovereignty of the states. The constitution of each particular state must be looked to, to determine in whom the power of negotiating and contracting treaties with foreign powers resides.

In republics the chief magistrate, or the senate, or executive council, or both of these conjointly, are intrusted with the exercise of this sovereign power. Treaties to which the United States govt. is a party are made, on behalf of the United States, by the pres., by and with the consent of the senate, two-thirds of the members of the senate present concurring. The several states of the Union are incompetent to form any treaty, alliance, or confederation; nor can they lawfully or validly (without consent of congress) enter into any compact or agreement among themselves or with a foreign state. A treaty made by the United States is forthwith the law of the land.

In monarchies, whether absolute or constitutional, the treaty-making power is vested usually in the sovereign. By the constitution of Great Britain, the exercise of this power is subject to parliamentary censure: ministers who advise the conclusion of any T. afterward judged derogatory to the national honor, or against the national welfare, being liable to impeachment, of which several instances appear in Eng. history.

No special form of words is necessary for the validity of a T.: but modern usage requires that a T. originally verbal should as soon as possible be committed to writing.—A class of compacts between nations are included in the exercise of a general implied power confided to certain public agents as incidental to their official position; such are the acts of generals or admirals limiting hostilities by truces, capitulations, or cartels for exchange of prisoners·

these do not require ratification by the supreme authority, unless there be a reservation making that necessary. In other cases, however, a public minister or other diplomatic agent is not entitled to conclude or sign a T. with the foreign power to which he is accredited, without a full power additional to his general letter of credence. Even in the case of a T. concluded with full powers, it is often considered expedient to have a special ratification by the sovereign, or other proper executive authority of the state contracting.

A T. is considered extinguished when one of the contracting powers loses its existence as an independent state, when the internal constitution of either state is changed so as to make it inapplicable; and in case of war between the contracting parties, unless the stipulations of the T. have been expressly with a view to the rupture. As there is often a difficulty in distinguishing stipulations perpetual in their nature, from those that are extinguished by war, it is common to insert clauses in treaties of peace reviving and confirming the treaties formerly subsisting between the contracting parties.

A Treaty of Guaranty is an engagement by which one state promises to aid another when it is disturbed or threatened in the peaceable exercise of its rights by a third power.

Treaties of alliance may be offensive or defensive: in the former, the ally engages generally to co-operate in hostilities against a specified power, or against any power with which the other may be at war; in the latter, the engagements of the ally extend only to a war of aggression begun against the other contracting party.

The execution of a T. is occasionally secured by hostages, as at the peace of Aix-la-Chapelle 1748, when several peers were sent to Paris as hostages for the restoration of Cape Breton by Great Britain to France.

TREBBIA, *trĕb'bē-â:* small but famous stream of Italy, rising in the Ligurian Apennines, near Montebruno, flowing n. through a mountain valley for the greater part of its course, and joining the Po two m. w. of Piacenza. Its entire length is about 50 m. On its banks Hannibal decisively defeated the Roman consul Sempronius B.C. 218.

TREB'IZOND: chief town of the eyalet T.; flourishing seaport on the Black Sea coast, about 110 m. n.w. of Erzerum. It is surrounded by walls of great extent, inclosing numerous gardens as well as the town itself. Outside the walls are suburbs, where most of the Christian inhabitants reside, and in which are the principal bazaars and khans. The city is defended by forts along the walls, and by a fortified citadel upon a high rock on one side of the town. It has a good harbor, which, however, is considered safe only in summer, the roadstead of Platena, 7 m. w., being employed for the rest of the year. There are numerous mosques and 'medressehs' (or colleges), and ten churches for Greek Christians. There are copper-foundries, dye-works, etc. The geographical position of T., is, in a commercial view, rivalled only by that of Alexandria, and

has made it the great entrepôt of the commerce between e. Europe and central Asia, and the second commercial city of the Turkish empire. European goods are brought hither by regular services of steamers from Constantinople and the mouths of the Danube; and goods from Asia by caravans from Erzerum, Tabriz, and Syria. The value of annual imports by sea is about $7,500,000; of annual exports probably about $5,000,000. The inland traffic with Anatolia is supposed also to represent a value of nearly $5,000,000. The goods brought overland comprise silk, wool, tobacco, wax, gall-nuts, oil, opium, drugs of various kinds, honey, timber, carpets, and shawls; and those arriving by sea are principally cotton cloths, glass, cutlery, firearms, grain, iron, tin, spices, etc.—Pop. of T. estimated 32,000, of whom 2,000 are Armenians, about 8,000 Greeks, and the rest Turks; (1885) 45,000; (1898) est. 35,000.

T. is the anc. *Trapezus*, and was founded by a colony from Sinope; it was a flourishing town under the Colchians, when Xenophon arrived there in his famous retreat from Persia. Conquered from Mithridates by the Romans, it rapidly rose in importance, became a free city, was made by Trajan the cap. of Pontus Cappadocicus, and by the same enlightened ruler was provided with a larger and better harbor. On the capture of Constantinople by the Crusaders 1204, and the expulsion of the Comnenian emperors, one of the imperial family, Alexis, established himself at T., where he had previously exercised the functions of governor, and founded a state known as the *Empire of Trebizond*, which stretched from the Phasis to the Halys, and maintained its independence against the Turks till 1462, when the last emperor was defeated and captured by Sultan Mohammed II.

TREBIZOND, or TREBISOND, *trĕb'ĭ-zŏnd* (in Turkish, *Tarabezûn*, Gr. *Trapezus*): Turkish eyalet in n.e. Asia Minor, stretching 240 m. along the s.e. shore of the Black Sea. The surface is mostly mountainous, the slopes toward the sea being thickly wooded. The e. portion of the eyalet is known as Lazistan, from its inhabitants, the Lazi, a savage vindictive race, notable for barbarous manners and predatory habits. The port of Batoum and a part of Lazistan on the Russian frontier were ceded to Russia 1878. Next to the chief city, Trebizond, the most important towns in T. are Samsoun, Kerasun, and Gumish-Khaneh. —Pop. (1885) 1,047,700; (1898) est. 1,163,800.

TREBLE, a. *trĕb'l* [OF. *treóle*, F *triple*, threefold—from L. *triplus;* Gr. *triplous*, threefold (see TRIPLE)]: threefold; acute in a threefold degree; pertaining to the voice or voice-part called treble or soprano: N. in *music*, the highest of the four parts in a harmonized piece of music, generally containing the melody, and sung by a Soprano (q.v.) voice: one who plays or sings the treble: V. to multiply by three; to become threefold. TREB'LING, imp. TREBLED, pp. *trĕb'ld.* TREB'LY, ad. *-lĭ*, in a threefold number or quantity. TREBLE CLEF, the G clef (see CLEF).

TREBUCHET, n. *trĕb'ū-shĕt* [F. *trébuchet*—from mid. L. *trebuchetum*, a warlike engine—perhaps from L. *trabs*, a beam] a warlike engine used in the middle ages for throwing stones and other missiles, and sometimes fiery material, into beleaguered places; a kind of weighing-scales; a cucking-stool; a kind of trap; also written TREB'UCKET, n. *-ū-kĕt*.

TRECENTO, n. *trā'chĕn-tō* [It., 300, but used for 1,300]: in *art*, term applied to the style of art prevalent in Italy in the 14th c.; called sometimes the Early Italian style.

TRECHOMETER, n. *trĕ-kŏm'ĕ-tĕr* [Gr. *trechō*, I run; *metron*, a measure]: kind of Odometer (q.v.) or contrivance for ascertaining the distance run by vehicles.

TREDDLE, n. *trĕd'dl:* same as TREADLE.

TREDEGAR, *trĕd'ē-gâr:* market-town on the n.w. border of Monmouthshire, England; 18 m. n.w. of Newport, about 150 m. w. of London. It stands in a district with extensive iron-works and coal mines, which employ many of the inhabitants.—Pop. (1881) 18,771; (1891) 17,484.

TREDGOLD, *trĕd'gōld*, THOMAS: English writer on architecture and engineering: 1788, Aug. 2—1829, Jan. 28; b. Brandon, Durham. At the age of 14 he was apprenticed to a cabinet-maker; 1808–13 he worked as a journeyman carpenter in Scotland; then removed to London, where 1823 he began business on his own account as civil engineer, having given his leisure from boyhood to the study of architecture and engineering, and later of mathematics, chemistry, mineralogy, and geology. T.'s great works are: *The Elementary Principles of Carpentry: a Treatise on the Pressure of Beams and Timber Frames, the Resistance of Timber, the Construction of Floors, Roofs, Centres, and Bridges* (4to, 2d ed. 1828); and *Strength of Cast Iron* (3d ed. 1831). He wrote other works and many contributions to scientific periodicals.

TREE, n. *trē* [AS. *treow;* Goth. *triw;* Icel. *tré*, a tree, wood: Skr. *dru*, wood, a tree: W. *derw;* Gr. *drus*, an oak]: perennial plant rising to some distance, with a single woody stem bearing a head of branches and twigs; something resembling a tree; a cross; a piece of timber, or something usually made of timber: V. to make to ascend or take refuge in a tree; to place in a difficulty; to form, shape, or stretch on a beam or block of wood called a 'tree.' TREE'LESS, a. *-lĕs*, destitute of trees. TREENAIL, one of the long wooden bolts used in fastening the planks of a ship to the timbers; one of the bolts which connect layers of masonry. GENEALOGICAL or FAMILY TREE, a representation of a tree in which the different divisions of a family are exhibited as the branches, and the relation of each family to the common ancestor, as the trunk or stock, shown.

TREE: perennial plant having woody stem and branches, the stem generally single, and bearing a head of branches and twigs; whereas a Shrub (q.v.) generally has a number of stems springing from one root. The terms tree and shrub are not, however, of very exactly defined signification; and many shrubs, under certain circumstances, assume the form of trees, either naturally or by help of art; while trees are, in other circumstances, converted into shrubs: the common hawthorn, e.g. often a mere shrub, sometimes appears as a tree, with stem and head as perfect as the greatest monarch of the forest. The gooseberry bush is trained in British gardens in a tree-like habit notwithstanding its small size and the shortness of its stem; this, however, is entirely artificial, its natural habit being that of a shrub, to which, but for the gardener's knife, it would almost certainly relapse in a single year. The greater number of trees are exogenous. Palms are almost the only endogenous plants to which the name tree can be given. Very different from the ordinary exogenous trees are the Gymnogens (q.v.) of Lindley—firs, pines, yews, etc. Trees are found in all climates except the coldest; but the number of species, as well as the luxuriance of the forests, is greatest in the tropics. As we advance toward the polar regions, or ascend high mountains, trees first dwindle to shrubs, then to a creeping habit, and finally disappear before other forms of vegetation. Every kind of tree has its peculiar character, not only in foliage, but in general form and mode of branching. It is said that there is much coincidence between the shape of an entire tree and that of its leaves. An ash is as easily distinguished from an elm, by a practiced eye, in winter, when destitute of leaves, as in the full foliage of summer. The ordinary duration of life is various in different species. There are trees in England supposed to be more than a thousand years old, still flourishing. It is to be remembered, however, that biologically only the outer part of trunk and stem is really living, the solid wood being in a state of finished life and of rest, for the most part, and serving only as support; hence a tree may flourish when hollow with decay, like the old Charter Oak of Hartford, Conn., before its wreck by storm. Further, the computation of a tree's years by the number of rings in the wood is not accurate, since periods of drought may increase the number of rings. Oaks and yews are among the trees of longest life. The Baobab of Africa is regarded as a very long-lived tree: see EUCALYPTUS: SEQUOIA.—See ARBORICULTURE.

No acotyledonous plant assumes the character of a tree, except a few ferns, known as Tree-ferns.

TREE'-FERN: fern with tree-like woody stem, and a head of fronds resembling leaves of palms. They are found only in some tropical and sub-tropical countries. One species, *Alsophila gigantea*, which has a thick black trunk surmounted by a feathery crown, is found in the Himalaya, at an elevation of 7,000 ft. The soft central part of the stem of *Cyathea medullaris* is an article of food

in New Zealand. Tree-ferns are a characteristic feature of the vegetation of New Zealand.

Tree-fern.

TREE'-FROG, or TREE'-TOAD: Batrachian (q.v.) of family *Hylidæ*, separated from the true frogs (*Ranidæ*) on account of the dilated disks or suckers at the tips of the toes, which are covered with a viscid secretion, and enable the animals to climb trees. The *Hylidæ* or tree-frogs are of small size, more elegant in form than the true frogs, of brighter colors and more active habits. They feed on insects, which they pursue on the branches and among the leaves of trees or shrubs, stealing toward them, and suddenly springing upon them. They deposit their spawn in water, like other batrachians—some of them on the edges of leaves hanging over water—and hibernate in mud. Their croaking is louder than that of true frogs, and is heard sometimes from the tops of high trees. One species of T.-F. occurs in middle and s. Europe, also in Asia and n. Africa: the warmer regions of the old world have numerous species, and in America they are still more abundant. Some occur in Australia. The T.-F. of Europe (*Hyla arborea*)—*Rainette* of the French—is found chiefly in moist woods, and in hedges near water. Although one of the smallest of European frogs, it can spring more than 3 ft. high to seize an insect. It becomes very noisy on the approach of rain, and is often kept in confinement to serve as a kind of barometer.—The COMMON TREE-TOAD or T.-F. (*H. versicolor*) of the e. United States, w. to Kan., is green, gray, or brown, with irregular gray blotches, above:

beneath, it is yellow; its loud trills are heard at night, especially in damp weather. Pickering's Tree-toad of the e. states is of yellowish-brown or fawn color, with dark rhombs or lines, the limbs with bars; its length is 1 in., half the size of the preceding. *H. Squirella*, S. C. to Ind., 1¼ in., is olive-green and blotched above, with a white line along the jaw to the shoulder. *H. Andersonii*, N. J. to S. C., rare, is pea-green, the sides yellow-spotted, and a purple band from the eye to the arm; size 1½ in. The Swamp Tree-frog (*Chorophilus triseriatus*), 1 in. in length, is bluish-ash, with a dark dorsal stripe from the nose, branching at the middle of the body, but somewhat variable in color. It prefers swampy ground to trees. Its 'rattle has a rising inflection.'

TREES OF LIBERTY, or Liberty Trees: trees planted in times of political revolution, as the symbol of growing freedom. This symbolical custom was common in some of the Amer. colonies during the revolutionary war; and was imitated and its ceremonial greatly developed in France during the Revolution. The Jacobins in Paris are said to have planted the first tree of liberty 1790; and the custom spread rapidly through the whole of France. In almost every village around these trees crowned with the cap of liberty, the people gathered, dancing, and singing revolutionary songs. Poplars were at first employed; afterward oaks were substituted. This custom was regulated by a decree of the Convention, and diffused over foreign countries by the republican armies. During the Reign of Terror, thousands lost their lives under pretext of having injured a tree of liberty.—During the February revolution of 1848, trees of liberty again came into vogue —generally hung with tri-colored ribbons, circles, and triangles, the symbols of unity and equality, and surmounted with the cap of liberty. Frequently they were consecrated by priests.

TREFLEE, a. *trĕf'lē* [F. *trèfle*, trefoil]: in *her.*, term applied to a cross, the arms of which end in triple leaves, representing trefoils.

Trefoil in Heraldry.

Trefoil in Architecture.

TREFOIL, n. *trē'foyl* [L. *trifolĭum*, three-leaved grass—from *tres*, three; *folĭum*, a leaf: F. *trèfle*]: a three-leaved leguminous plant, such as Clover (q.v.), Buckbean (q.v.), Lotus (q.v.), Medic (q.v.), etc.; an architectural ornament resembling the three-leaved clover; in *her.*, a charge representing the clover-leaf, which is always depicted as *slipped* —i.e., furnished with a stalk.

TREGELLES, *trē-gĕl'lēs*, SAMUEL PRIDEAUX, LL.D.: New Testament critic and editor: 1813, Jan. 30—1875, Apr. 24; b. near Falmouth, England; of Quaker family. He joined the Plymouth Brethren (q.v.); and in his latter years became a member of the Church of England. He did not receive a university education, and spent his early life in secular occupation; yet at the age of 25 he had formed the plan of a Greek New Test., on the principles which he afterward carried out. In preparing for his *magnum opus*, he visited the continent in search of MSS.; and, as connected with it, he published, among other works, an ed. of the *Codex Zacynthius*, an *Account of the Printed Text of the Greek New Testament* (1854), and *Introduction to the Textual Criticism of the New Testament* (1856). His *Critical Edition of the Greek New Testament* (1856–72) stands, as to manner of treatment, between that of Lachmann and that of Tischendorf. T. goes further than Tischendorf in his dependence on ancient and rejection of modern MSS. In 1862 T. received a pension of £100, doubled 1870.

TREILLE, n. *trĕl* [F.]: in *her.*, a lattice; trellis.

TREK, v. *trĕk* [Dut. *trek*, draught; *trekken*, to draw or pull]: in *s. Africa*, to haul or draw, as a wagon; to travel by ox-wagon; journey from place to place; emigrate; migrate: N. a journey or march. VOOR-TREKKER, n. *vôr-trĕk'kĕr* [Dut. *voor*, before]: a pioneer; an emigrant; a first settler.

TRELLIS, n. *trĕl'lĭs* [F. *treillis*, any latticed or grated frame—from *treille*, an arbor or walk covered with vines—from L. *trĭchĭla*, an arbor or summer-house: origin doubtful: but comp. L. *trilix*, triple-twilled—from *tres*, three; *licium*, a thread]: a structure or frame of light cross-bars used as a screen or to support plants, etc.: V. to furnish with a lattice or open framework. TREL'LISING, imp. TREL'LISED, pp. *-lĭst*, furnished with a trellis, or formed as a trellis. TREILLAGE, n. *trĕl'lāj* [F.]: a contexture of light posts and rails used to support Espaliers (q.v.).

TREMANDO, n. ad. *trĕ-măn'dō* [It., shaking—from L. *tremo*, I shake]: in *music*, a general shake of the whole chord; the term directing it to be done.

TREMATODA, n. plu. *trĕ-măt'ō-dă* [Gr. *trēma*, an opening or pore, *trēmătos*, of an opening; *eĭdos*, resemblance]: in *zool.*, an order of intestinal worms comprising the fluke-worm. TREMATODE, n. *trĕ'mă-tōd*, one of the Trematoda or flukes.—*Trematoda* or Trematode Worms constitute, according to Dr. Cobbold's system, the second order of the sub-class *Sterelmintha* (Owen), of the class *Helmintha*. In ordinary zoological classification, the T. form a division of the group of *Platyelmia* or 'flat-worms,' which group is in its turn included in the class *Scolecida*—a division of *Vermes* (see ZOOLOGY). This order, as the Greek word *Trēmatōdes* indicates, is characterized by the possession of sucterial pores or openings. All the animals included in it have soft, roundish, or flat bodies, and their visceral organs are lodged in the parenchyma of the body. Most of the T. are hermaphrodites. They seldom attain

large size (greatest length about five inches), but are usually visible to the naked eye. Like all Scolecida, the T. have a peculiar system of vessels ramifying through their bodies —the 'water-vascular' system.

The T. flukes, as they are popularly called, from their resemblance in form to small flukes or flounders, are not parasitic during the whole period of their existence. They perform active and passive migrations from parasitic to non-parasitic abodes; and during their larval wanderings in search of a final resting-place suitable to their adult condition, they provisionally occupy the bodies of different kinds of invertebrata (see Cobbold's *Entozoa*). In *Synopsis of the Distomidæ* (1861), Dr. Cobbold recognizes 344 species of flukes, of which 126 belong to fishes, 47 to reptiles, 108 to birds, 58 to mammals, and 5 to the invertebrata. Afterward he placed the number of species in the order at 400, at the lowest possible estimate: these he divided into the five families *Monostomidæ*, *Distomidæ*, *Tristomidæ*, *Polystomidæ*, and *Gyrodactylæ*—names based, except in the last case, on the number of their pores or oval suckers.

Van Beneden arranges these families into (*a*) *Monogenea* and (*b*) *Digenea*, the development in the former being simple, while in the latter there is an alternation of generation, the nurses and larvæ living chiefly in mollusks, while the adult animals live chiefly in the bodies of vertebrate animals. The *Monostomidæ* and *Distomidæ* belong to the latter, and the others to the former group. The family of *Distomidæ* comprises the principal and best-known genera of the order *Trematoda*, and its members are at once recognized by the presence of two pores or suckers—one, the anterior, connected with the mouth; the other, termed the acetabulum, usually on the ventral surface, in the middle line.

The following members of this order are of special interest, as very liable to infest man. *Fasciola hepatica* (see FLUKE) is not only common in all varieties of grazing-cattle, especially sheep, but has been found in the horse and ass, in the hare and rabbit, in the squirrel, beaver, kangaroo, etc., and is occasionally found in man, not only in the liver and gall-bladder, but beneath the skin in various parts, e.g., in the sole of the foot, behind the ear, and in the scalp: see ROT. *Distoma lanceolatum* is a species frequent in the sheep and ox, and has been found (infrequently) in the human subject. *Distoma ophthalmobium* has been occasionally found in the lens of the human eye. *Distoma hæmatobium* (*Bilharzia hæmatobia* of Cobbold) is the only known trematode not hermaphroditic.

The male is a cylindrical worm, only about half an inch in length; while the female is filiform, longer and much narrower than the male, being about $\frac{4}{5}$ of an inch in length. The first specimens were found by Bilharz of Cairo in the portal system, and the worm has since been found in the veins of the mesentery, bladder, and other parts. This parasite is common along the borders of the Nile, in s. Africa and the Mauritius. It is so common in

Egypt that, in 363 examinations of the body after death, Griesinger found it no less than 117 times.

The principal feature of the disease caused by this worm consists in a general disturbance of the uropoietic function. Diarrhœa and hematuria occur in advanced stages of the complaint, being frequently associated also with the so-called Egyptian chlorosis, colicky pains, anæmia, and great prostration of the vital powers. The true source of the disorder, however, is easily overlooked unless careful microscopical examination be made of the urine and other evacuations. If blood be mixed with these, and there be also a large escape of mucus, a minute inspection of the excreta will scarcely fail to reveal the characteristic ova of *Bilharzia*.—Other trematodes are occasionally found in the human subject.

TREMBLE, v. *trĕm'bl* [F. *trembler;* It. *tremolare*, to tremble, to shake—from mid. L. *tremŭlārĕ*, to tremble—from L. *trĕmŭlus*, shaking; *trĕmĕrĕ*, to shake]: to shake with fear, cold, or weakness; to quiver; to shiver; to shake, as the voice: N. the act or state of trembling, as, in a *tremble*. TREM'BLING, imp. *-blĭng:* N. the act or state of shaking, as from fear, cold, etc. TREMBLED, pp. *trĕm'bld*. TREM'BLER, n. *-blĕr*, one who trembles. TREM'BLINGLY, ad. *-lĭ*. TREMBLING-POPLAR, the aspen-tree. TREMBLORES, n. plu. *trĕm-blō'rēz*, the name given by the Sp. settlers of S. Amer. to the 'surface-tremors,' which in some volcanic districts are almost of daily occurrence.

TREMELLA, *trē-mĕl'la:* genus of fungi, of the division *Hymenomycetes*, soft and gelatinous, of no very determinate form, growing mostly on decaying wood. In some places in Britain they receive such names as Witches' Meat and Witches' Butter. Superstitious notions have been connected with them, and imaginary medicinal value has been ascribed to them.

TREMELLOID, a. *trĕm'ĕl-loyd* [Gr. *trĕm'ō*, I tremble; *eidos*, resemblance]: in *bot.*, jelly-like in substance or appearance; resembling a fungus of the genus *Tremella*.

TREMENDOUS, a. *trĕ-mĕn'dŭs* [L. *tremen'dus*, fearful, dreadful—from *trĕmo*, I tremble]: sufficient to excite fear or terror; dreadful; terrible; hence, extremely violent or great; wonderful; astounding. TREMEN'DOUSLY, ad. *-lĭ*. TREMEN'DOUSNESS, n. *-nĕs*, the state or quality of being tremendous.—SYN. of 'tremendous': dreadful; fearful; frightful; terrible; horrible; awful; terrific.

TREMOLITE, n. *trĕm'ō-līt* [from *Tremola*, a valley of Switzerland, where first found]: a variety or sub-species of Hornblende (q.v.), occurring in large prismatic crystals, pearly and semi-transparent; it is composed of silica, magnesia, lime, and a very little fluoric acid.

TREMOLO, n. ad. *trĕm'ō-lō* [It., trembling—from L. *trĕmŭlus*, shaking (see TREMBLE)]: in *music*, a term indicating that a note or chord is to be so played as to produce a tremulous effect. In singing, a T. effect is advantageous on rare occasions, but is often a resort of inferior singers to conceal defective tone or style. T. is also the name of a stop in an organ by which this T. effect is produced.

TREMOR, n. *trĕm'ŏr* or *trē'mŏr* [L. *tremor*, a shaking —from *tremĕrĕ*, to tremble: It. *tremore*]: a shivering or shaking; a quivering or vibratory motion.

TREMULOUS, a. *trĕm'ū-lŭs* [L. *trĕmŭlus*, shaking, trembling (see TREMBLE): Sp. *tremulo*]: affected with fear or timidity; shaking; vibratory; quivering. TREM'ULOUSLY, ad. *-lĭ*. TREM'ULOUSNESS, n. *-nĕs*, the state of being tremulous or quivering.

TRE'NAIL: see TREENAIL.

TRENCH, n. *trĕnch* [Prov. *trencar*, to cut off: It. *trinciare;* F. *trancher*, to cut off or to pieces: Sp. *trincar*, to break: origin doubtful—perhaps L. *truncārĕ*, to maim, to cut off]: a narrow cut or ditch excavated in the earth; in *mil.*, a deep ditch cut for defense, or for the shelter of besieging troops as they approach the works they desire to take; the wall or breastwork formed by the earth thrown out of the ditch (see SIEGE): V. to cut; to furrow deeply with the spade or plow; to dig a ditch in; to fortify or defend with trenches and earthen breastworks; to encroach upon. TRENCH'ING, imp.: N. the act of cutting into narrow ditches; the preparation of soils by deep cutting and exposure. TRENCHED, pp. *trĕncht:* ADJ. furrowed or cut deep. TRENCH'ER, n. *-ĕr*, one who trenches; a wooden plate on which meat may be cut or carved; that which the trencher contains; food; a trencher-cap. TRENCHER-CAP, a square cap worn by professors and students at some universities; a 'mortar-board' cap. TRENCHER-FRIEND, in *OE.*, a parasite. TRENCHER-MAN, a feeder; a great eater. TRENCH-PLOW, a plow that turns up land to a greater depth than that effected by the ordinary plow. TRENCHANT, a. *trĕnch'ănt* [OF. *trenchant*, cutting—from *trencher*, to cut]: cutting; sharp; severe. TO OPEN THE TRENCHES, to begin the siege of a fortified place.

TRENCH, *trĕnch*, RICHARD CHENEVIX, Archbishop of Dublin: clergyman, poet, and scholar of the Church of England: 1807, Sep. 9—1886, Mar. 28; b. Dublin; of an Anglo-Irish family of Galway, the Trenches of Woodlawn. He was educated at Harrow and at Trinity College, Cambridge, where he graduated 1829. After travelling a few years he became a country curate; and 1835–46 he published six vols. of poetry, favorably received, and reissued in *Poems Collected and Arranged Anew* (1865); the first of them was *The Story of Justin Martyr*. In 1845 T. was presented to the rectory of Itchin Stoke; 1847 he became theol. prof. in King's College, London; 1856, dean of Westminster; 1864, abp. of Dublin, which office he resigned 1884.—T.'s poetry was marked by sensibility and refinement, but not by genius. His theological writings laid his contemporaries under deep debt of gratitude, not so much for their originality or critical insight as for their treasures of erudite illustration admirably selected to convey most valuable information in most desirable form. T.'s *Notes on the Miracles* (1846) and *Notes on the Parables* (1841; 13th ed. 1880) have had immense circulation. In the field of philology, while his interest was not in scien-

tific problems for their own sake, he took pains to secure accuracy in his facts, and fascinated his readers with the fossil poetry and fossil history imbedded in language.' In this field, his charming little works, *Study of Words* (1851, more than 20 editions in the United States in the first ten years), *English Past and Present* (1855, many eds.), *Select Glossary of English Words* (1859, many eds.), have popularized historical study of the Eng. tongue—giving an impulse also to philological science. His principal works beside those above noted are: *The Lessons in Proverbs* (1853); *Studies on the Gospels* (4th ed. 1878); *Hulsean Lectures* (1845; 5th ed. 1880); *The Sermon on the Mount illustrated from St. Augustine* (1844); *Sacred Latin Poetry* (1849); *St. Augustine as an Interpreter of Scripture* (1851); *Synonymes of the New Testament* (1854); *The Epistles to the Seven Churches of Asia Minor; An Essay on the Life and Genius of Calderon; Deficiencies in Our English Dictionaries;* and *Lectures on Mediæval Church History* (1878).

TRENCHARD, *trĕnch'ĕrd*, Stephen Decatur: 1818, July 10—1883, Nov. 15; b. Brooklyn: naval officer. He was appointed midshipman in the U. S. navy 1834; promoted passed midshipman 1840, lieut. 1847, commander 1862, capt. 1866, commodore 1871, and rear-admiral 1875; and was retired 1880. He was on coast-survey duty 1845–6 and 1853–57; was presented by Queen Victoria with a sword and by the underwriters with a watch for rescuing the English bark *Adieu* and saving the cargo and all hands; and was on the *Powhattan* during her diplomatic cruise to China and Japan 1857–60. He distinguished himself in the civil war; and 1876, as commander of the n. Atlantic squadron, had 21 vessels under his charge, the largest individual fleet since the war.

TRENCK, *trĕnk*, Franz; and Frederick von der: two German barons and soldiers, of ancient E. Prussian family; cousins; whose adventures, recorded in autobiographies, have given them wide fame. Both were men of great physical strength; both blended in their character the hero and the braggart; both were subject to fits of uncontrollable passion; and both told premeditated lies.

Baron Franz von der T.: 1711, Jan.—1749, Oct.; b. Reggio, in Calabria, where his father was an Austrian general. At the age of 17 he received a commission as a cavalry officer, fought duels, and cut off the head of a man who refused to lend him money. He fled to Russia, where he was made a capt. of hussars. He was then a young giant 6 ft. 3 in. high; and it is probable that he knocked down his commanding officer, as he says he did, for rebuking him. He adds that he was placed under arrest while an engagement was going on; that, Marshal Münnich happening to pass, he called out that if set free and pardoned he would bring back three Turks' heads in an hour; that he was set free, and brought back four Turks' heads suspended from his saddle. This story may or may not be true; but certain it is that he was cashiered not long afterward, and returned to settle on his estates in Croatia. There first his career becomes historical. The Turkish

frontier was overrun with banditti. T. armed and drilled 1,000 of his tenants, whom he called Pandours, and by their means succeeded in restoring order. He then offered the services of his regt. to Maria Theresa, and his aid was accepted. In 1740 he took part in the Silesian war at the head of his men, and perpetrated atrocious deeds of rapine and cruelty. There had been no such monster, says Carlyle, since Attila and Genghis. He attacked Cham, a fine trading-town in neutral territory, 1742, Sep. 7—an act in defiance of all law and discipline—and completely annihilated it. After the battle of Sohr, 1745, Sep., he offered to capture Frederick the Great, and bring him a prisoner to the Austrian camp. He failed in the enterprise, with great loss of men; but he secured the king's tent and much valuable booty. Suspicions were, however, entertained of his having been bribed to release the king; and he was tried by court-martial. He was imprisoned at Vienna, but escaped with assistance of Baroness Lestock, who bribed the jailers to allow him to be conveyed in a coffin, as if dead, beyond the city walls; was again captured at Bruges, and imprisoned at Grätz, where he took poison, and died. —See Carlyle's *Life of Frederick the Great;* and *Mémoires du Baron Franz de Trenck* (Par. 1787), written by himself.

Freiherr FREDERICK VON DER T.: 1726, Feb. 16—1794, July 25; b. Königsberg; son of a major-gen. in the Prussian service. He distinguished himself at the university. At the age of 16 he became a cornet in the guards; and, two years afterward, Princess Amalie, who saw him at a ball, we are told, conceived a violent passion for him. To this he attributed the king's subsequent antipathy toward him. There was, however, a much better reason: he was detected in a correspondence with his Austrian cousin, not long before the attempt to capture the king, and was arrested. 1746, Dec., he escaped; went to Vienna, where he fought several duels; then took a command in the Russian service. At the end of the war, the empress gave him a diamond-hilted sword, and a Russian princess bequeathed to him her fortune. Venturing to revisit Germany, he was arrested and imprisoned in the fortress of Magdeburg, where 'his efforts to escape secured him the honor of a specially constructed cell, a heavy burden of chains, and the additional punishment of being roused every quarter of an hour by the sentries.' Carlyle shows that T. had been in prison three months, and was there when the battle of Sohr took place, though he vividly describes his own adventures in the fight. He was accused of this lie in his own time, and admitted that he must have made a mistake: 'He had nothing but his poor, agitated memory to trust to.' He was released 1763, Dec. 24, through the efforts of Princess Amalie, who had not ceased to befriend him, and afterward settled at Aix-la-Chapelle, where he married the burgomaster's daughter, and went into business as a wine-merchant. He published his Memoirs in 1787: the book was translated into many languages, and T. became the most famous personage of his time. The ladies at Paris, Berlin, and Vienna wore bonnets, dresses, and rings *à la*

Trenck; and no less than seven plays founded on his adventures were brought out on the French stage; though Carlyle found reason in the Memoirs to characterize T. as 'an extensively famous blockhead.' His praise of the French Revolution brought him into serious trouble in Austria; and he went to Paris 1792 as a zealous adherent of the Mountain party; but there he was suspected as an emissary of Prussia, and was thrown into prison, where rumors among the prisoners, that the Prussians were advancing on Paris, and carrying all before them, were traced to T., who was in consequence condemned, and dragged to the guillotine. On the scaffold, although 69 years of age, he manifested the ungovernable passion which had characterized him through life. He harangued the mob; and at length the executioner had by force to hold his head by the gray hair on the block, to meet the fatal stroke.—See Chambers's *Book of Days*, I. 260; Carlyle's *Frederick the Great*, IV.; *Friedrich Trenck's Merkwürdige Lebensgeschichte von ihm selbst beschrieben* (2 vols. Berl. 1787); and *Leben und Thäten der Trencke*, by Watermann (2 vols. Leip. 1837).

TREND, v. *trĕnd* [Fris. *trund;* Dan. and Sw. *trind*, round: AS. *trendel*, a circle]: to have a general course or direction, as a coast-line; to stretch; incline; run: N. inclination in a particular direction. TREND'ING, imp.: N. general course or direction; tendency. TREND'ED, pp.

TRENDELENBURG, *trĕn'dĕh-lĕn-bûrch*, FRIEDRICH ADOLF: philosopher: 1802, Nov. 30—1872, Jan. 24; b. near Lübeck, Germany. He studied at the universities of Kiel, Leipzig, and Berlin, giving his studies chiefly to the anc. classic writers and to classical philology. He early came under the influence of Schelling's school in philosophy. His doctorate dissertation (1826) was an attempt to define Plato's philosophy with the aid of Aristotle's criticism: *Platonis de Ideis et Numeris Doctrina ex Aristotele Illustrata.* He gave 7 years (1826–33) to preparing a critical ed. of Aristotle's treatise *De Anima.* T. became prof. extraordinary in Berlin 1833, and was ordinary prof. from 1837 till his death. He was a remarkably successful teacher, treating in turn all the usual philosophical systems and doctrines, and at the same time conducting classes for study of Aristotle for advanced students. T.'s philosophy was that of idealism in the ancient or Platonic sense.—He wrote *Elementa Logices Aristotelicæ; Logische Untersuchungen* (an important factor in discrediting the Hegelian philosophy); *Die logische Frage; Naturrecht auf dem Grunde der Ethik.*

TRENT, *trĕnt:* river of the midland counties of England, rising on the n.w. border of Staffordshire, about 10 m. n. of Burslem, about 600 ft. above sea-level. It flows first s.e. to the border of Derbyshire, and thence generally n.e. through the counties of Derby, Nottingham, and Lincoln, till it unites with the Ouse (q.v.) to form the Humber (q.v.). It receives the Derwent, Idle, and Tarn from the w., and the Soar from the s.; its length is 170 m., being navigable for barges 120 m., up to Burton-on-Trent.

TRENT, Austria: a town in the southwestern part of Tyrol, situated on the river Adige or Etsch, 19 m. n.e. of the Lago di Garda. It lies in a fertile valley, and has a very picturesque appearance, dominated by the ruins of a large castle. Among its numerous churches the most noteworthy are the cathedral, built in the 13th and 14th centuries in the Byzantine style, and entirely of marble; and the church of Santa Maria Maggiore, in which the meetings of the celebrated Council were held. The principal manufactures are silk, wine, brandies, and sausages. Pop. (1900) 24,868.

TRENT, Canada: a river discharging into Lake Ontario through the Bay of Quinté. The greater part of its course of 150 m. consists of a series of large, irregular and elongated lakes, parts of which are navigable. The stream itself furnishes water power, and large quantities of lumber are floated down on it. It passes the towns of Peterborough and Trenton.

TRENT, England: a river rising in Staffordshire, and flowing in a general n.e. direction through Derby, Nottingham, and Lincoln counties, emptying into the Humber estuary near its head. It is 145 m. long, and navigable 25 m., to Gainsborough, for vessels of 200 tons. It is connected by numerous canals with midland manufacturing cities.

TRENT AFFAIR, The: in American history, during the civil war, in Oct., 1861, Captain Charles Wilkes, U. S. N., intercepted at sea the British mail steamer Trent, bound from Havana to St. Thomas, and took off two Confederate commissioners, accredited to France, Messrs. Mason and Slidell, who were among her passengers. They were taken to Boston, and imprisoned in Fort Warren, but were released on Jan. 1, 1862, on the demand of the British government, and permitted to proceed to Europe. Secretary Seward accepted England's demand as an adoption of the American doctrine which denied the right of search.

TRENT, Council of: a celebrated œcumenical council of the Roman Catholic church. It met during the pontificate of Paul III. at Trent, in the Tyrol, in 1545, and comprised 4 legates, 11 cardinals, 25 archbishops, 39 procurators of absent bishops, and 7 generals of religious orders. The wars in Germany caused its transference to Bologna in 1546, and its sittings were for a time suspended. Pope Julius III. having reassembled it at Trent in 1551 it dispersed the year following on the approach of the Lutherans under Maurice of Saxony. After eight years of interruption it was again called together by Pius IV., continued its session until 1563, and then adjourned without finishing its labors. It defined many doctrines of the Roman Catholic church. Its decrees are embodied in what is known as the Creed of Pius IV. The council also published many reformatory decrees,

instituting seminaries and causing a catechism to be drawn up. All the decrees of the council as to dogma were unanimously accepted by the Catholic states, but those relating to discipline were partially rejected, especially in France, as contrary to the usages and infringing on the liberties of the Gallican church. The council issued its canons and decrees in Latin, and they have been often translated. The history of the council has been written by Sarpi and Pallavicino. See CATHOLIC CHURCH.

TRENT, WILLIAM PETERFIELD, D.C.L., LL.D.: American man of letters: b. Richmond, Va., 1862, Nov. 10. After study at the University of Virginia and at Johns Hopkins University, he was professor of English in the University of the South (1888-1900), and dean of its academic department (1894-1900). From 1892 to 1900 he was editor of the *Sewanee Review*. He has made a special study of Southern men and times, and has published: *Life of William Gilmore Simms* (1892); *English Culture in Virginia* (1889); *Southern Statesmen of the Old Régime* (1897); and a sketch of R. E. Lee (1899). His other works include *John Milton* (1899); *The Authority of Criticism* (1899); *War and Civilization* (1901); *The Progress of the United States in the Century* (1901); *A History of American Literature 1607-1865* (1903); *A Brief History of American Literature* (1904); *Greatness in Literature* (1905), and *Daniel Defoe* (1907). He has also edited: *Select Poems of Milton* (1895); *Essays of Macaulay* (1897); *Poems and Tales of Edgar Allan Poe* (1898); *Balzac's Comédie Humaine* (1900); and (with B. W. Wells) *Colonial Prose and Poetry* (1901).

TRENTAL, n. *trĕn'tăl* [F. *trente;* It. *trenta,* thirty—from L. *trigin ta,* thirty]: a collection or series of thirty: specifically, in the *Rom. Cath. Chh.*, an office for the dead consisting of thirty masses, recited for thirty days in succession after the person's death.

TREN'TON, Canada: a town and port of entry in Hastings co., situated on both sides of the Trent river at its mouth in the Bay of Quinté, 90 m. n.e. of Toronto, and at the junction of the Grand Trunk and Central Ontario railways. It has large manufacturing industries, and an extensive export trade in timber. Pop. (1901) 4,217.

TRENTON: city, county-seat of Grundy co., Mo.: on one of the forks of the Grand river, and on the Chicago, R. I. and P., and the Quincy, O. and K. C. railroads; about 100 m. n.e. of Kansas City and 80 m. n.e. of St. Joseph. It was established in 1841, in 1857 was incorporated as a town, and in 1893 was chartered as a city. Its limits were extended when it became a city. It is in an agricultural and stock-raising region, and nearby is a large coal field. The chief manufacturing establishments are flour mills, butter and cheese factories,

cigar factories, and machine shops. In 1900 (government census) there were in Trenton 86 manufactories. The shipments are chiefly farm and dairy products, live-stock, and coal. The educational institutions are Avalon College (U.B.), founded in 1881, a public school, the Jewett Norris library, which has an endowment of $15,000. The two banks, national and state, have a combined capital of $150,000. Pop. (1900) 5,396; (1910) 5,656.

TREN'TON: city, cap. of Mercer co., and of the state of N. J.; on the Delaware river at the head of steamboat navigation, and on the Delaware and Raritan canal and the Assanpink creek; and on the Pennsylvania, and the Philadelphia and Reading railroads; 33 m. n.e. of Philadelphia, 57 m. s.w. of New York. It is noted for its associations with the revolutionary war and early history of the federal government, and for its large manufacturing interests. It has a healthful site; has excellent surface drainage and an improved sewage system; is supplied with water from the river by a system owned by the city since 1859, and efficiently conducted. The most noted industry is the manufacture of pottery goods. This industry had its beginnings in 1852, and was greatly stimulated by the Centennial of 1876, at which the exhibition of ivory porcelain and Parian vases of the Trenton manufacturers attracted wide-spread attention, and led to increased demand. Trenton is now the most famous pottery centre in the United States; the products include the finest qualities of porcelain, granite and white ware, and sanitary ware. The next industry in importance is the manufacture of iron and steel, steel wire being the chief product; the largest establishment is that of John A. Roebling's Sons, which employs between 2,000 and 3,000 men. The great cables for the Brooklyn bridge were made at the works of this company. The rubber manufacture is also of importance, the products being valued at about $4,000,000 annually. Other industries are the manufacture of brick and tile, lamps and reflectors, carriages, and furniture. The census of 1900 reported 570 manufacturing establishments in Trenton with over $26,000,000 capital, and employing 14,450 persons. Trade and commerce are facilitated by the city's position at the head of navigation, and by its important railroad connections, and by the canal advantages. It is also connected with New York and Philadelphia by trolley lines.

The notable public buildings of Trenton include the State-house, remodelled and rebuilt after partial destruction by fire; the Federal building; the County Court house; and the State Arsenal. The public monuments of special note are the 'Swamp Angel,' an 8-inch Parrott rifle, the first gun fired from Morris Island, S. C., into Charleston 1863, Aug. 21, mounted on a stone pedestal; a 46-ft. monument to George B. McClellan; the statue of Washington (exhibited in the Italian section of the

Centennial Exhibition); and a monument erected by government, state, and private aid, in commemoration of the revolutionary battle of Trenton. There is a large public park, Cadwalader Park, of about 100 acres, several smaller parks, and attractive grounds around the public buildings. The city contains the State penitentiary, and the State asylum for the insane; there is a large city hospital, and several other hospitals, of which two, the Mercer and the William McKinley Memorial, have training schools for nurses; there is also a Children's Home, the Widow's and Single Women's Home, and numerous smaller institutions. The city has excellent graded schools, a public high school, and is the seat of the State Normal School, State Model School, State Industrial School for Girls, State School for Deaf Mutes; and of a Roman Catholic academy, a business school, and several private schools. In addition to the public library, which occupies a handsome building of white marble, the State library is open to the people of the city. There are about 50 churches in the city, the leading denominations being the Roman Catholics, the Methodists, Presbyterians, Baptists, and Episcopalians. The Quakers, who were at one time a large and influential body, are diminishing rapidly in both numbers and influence.

Trenton was partially settled 1676, and permanently 1680, and is supposed to have been named after William Trent, first chief-justice of the state. Trenton was the scene of two movements in the revolutionary war which did much to restore the waning ardor of the American troops and give renewed hope to patriots. After the disasters at Brooklyn and White Plains, Washington retreated into N. J., where a Hessian force pursued him across the state to the Delaware river. Washington led his army across the river 1776, Dec. 8, and on the morning of the 26th suddenly recrossed the ice-choked stream, and surprised and routed the Hessians. He again crossed the river to perfect defensive plans; and 1777, Jan. 1, returned to Trenton. On the following day he attacked Cornwallis on the n. side of the city, and closed the engagement in the evening at the Assanpink Bridge, having baffled, if not actually defeated, the British.—The continental congress was assembled in Trenton 1784, Nov. 1—Dec. 24, and in 1783 to 1785, there was some attempt to make Trenton the seat of the Federal government; the proposed appropriation for Federal buildings was, however, defeated. Washington was given a grand reception at the Assanpink Bridge 1789; the town was made the capital of the state 1790, and given a city charter 1792; was the seat of the federal government during the yellow-fever epidemic in Philadelphia 1793; and was the home of President John Adams, 1798. In 1804, the all land stage route from Jersey City to Philadelphia was completed by the opening of a bridge across the Delaware river at Trenton; the same year the Tren-

ton bank was organized, being one of the first in the State. Between the years 1830 and 1840, the canal was constructed, and important railroad connections were established, and the industrial and commercial growth of Trenton fairly begun, which has continued from that time practically without interruption. After the adoption of the New Jersey State Constitution in 1844, the charter of Trenton was altered. The old charter was very conservative, only a few offices being elective, and the suffrage limited by property qualifications. The modern government resembles that of most American cities, an elected mayor and common council, with various boards for the administration of the departments; the police and fire departments have been effectively removed from political influence. The villages of Millham and Chambersburg were annexed to the city 1886, May 1. Pop. (1900) 73,307; (1910) 96,815.

TRENTON: city, county-seat of Gibson co., Tenn.; on the Mobile and Ohio railroad; about 82 m. n.e. of Memphis. It is in a fertile agricultural region in which an excellent quality of cotton is grown. The chief manufacturing establishments are cottonseed-oil mills, cotton compress, a large cotton mill, box factory, flour mills, and foundries. The educational institutions are the Peabody High School, Laneview Academy, graded elementary schools, and a library. The two banks (State) have a combined capital of $85,000. Pop. (1910) 2,402.

TRENTON FALLS: a series of six beautiful cascades in West Canada Creek, Oneida co., N. Y.; 15 m. n. of Utica. The cascades appear at intervals as the creek passes through a ravine 2 m. long. The total descent, in the 2 m., is 312 ft.

TRENTON STAGE: that interval of geologic time during which the Trenton strata of New York and Canada and the equivalent beds of other regions were laid down. Trenton strata are typically developed in the Mohawk Valley in New York State, the type locality being Trenton Falls on the South Canada Creek near Utica. The beds are typically limestones of a dark color and often argillaceous. They are very fossiliferous, among the common species being: *Rafinesquiva alternata, Plectambasites sericea, Dalmanella testudinaria, Presopora tycopordon, Calymmemrenaria, Trinucleus concentricus, Araphus gigas,* and many others. The formation is well developed in the valley of Lake Champlain, and in the Upper St. Lawrence Valley. In southern and central New York the formation is buried by several thousand feet of later strata. Where thus buried it is often a reservoir of gas or even oil. In the Upper Mississippi region it is represented by the Galena limestone. On the Cincinnati anticline it underlies the typical Cincinnati beds. In the Hudson Valley it is in part represented by

shales carrying a graptolite fauna with *Dicellograptus, Cocnograptus,* and other types. In age the formation is Middle Ordovician.

TREPAN, n. *trë-păn′* [F. *trëpan;* Sp. *trepano,* an auger: It. *trapano,* an auger, a trepan—from Gr. *trupănŏn,* an auger, a trepan—from *trupa,* a hole]: in *surg.,* a circular saw for removing a portion of the skull (see TREPHINE): V. in *surg.,* to perforate the skull and take out a piece for the purpose of relieving the brain from pressure. TREPAN′NING, imp.: N. the operation of making an opening in the skull to relieve the brain from compression or irritation; Trephining (q.v.). TREPANNED′, pp. *-păn̈d′*

TREPAN, v. *trĕ-păn′* [AS. *treppe,* a trap; *treppan,* to ensnare: OF. *trappan,* a snare or trap for animals]: to lay a trap for; to ensnare; to take by stratagem: N. a snare; a cheat; a deceiver. TREPAN′NING, imp. TREPANNED′, pp. *-păn̈d′.* TREPAN′NER, n. *-nėr,* one who trepans. Also spelled TRAPAN.

TREPANG, n. *trĕ-păng′* [Malay name]: an esteemed edible sea-slug or holothurian found in the Indian Ocean; also called sea-cucumber, and by the French *bêche-de-mer* =spade of the sea (see BECHE-DE-MER).

TREPHINE, n. *trĕ-fīn′* [from TREPAN 1]: an improved form of the trepan; a small cylindrical or circular saw with a centre-pin on which it works: V. to perforate with a trephine. TREPHI′NING, imp.: N. the act or operation. TREPHINED′, pp. *-fīn̈d′.*

TREPHIN′ING: the opening through a bone, especially the skull, by surgical operation. Not only the Trephine, but various forms of saws, mallet and chisel, bone forceps, elevator, etc., are employed. Prehistoric remains have been found in which the skull has been trephined, probably as a religious rite and almost certainly by use of stone implements. Trephining, other than of the skull, is seldom resorted to except to remove carious or necrotic bone or to evacuate a bone abscess. The operation on the skull is performed to protect or relieve the brain from pressure and irritation. Formerly the operation was resorted to only when the brain was seriously injured by collections of pus, blood, or projecting fragments of bone, in depressed fractures of the skull. Under antiseptic methods, the operation is so safe that it is now often performed in other cases of fracture, unless of the simple, undepressed form. Trephining is also used to remove brain tumors, to evacuate abscesses or effusions of blood from other causes than fracture, to xcise or relieve pressure believed to be causing epilepsy. In idiocy due to prevention of cerebral development by a skull abnormally small from premature ossification, a linear incision or saw wound has sometimes been made, on one or both sides of the median line, to allow expansion of the skull and development of the brain.

TREPIDATION, n. *trĕp'ĭ-dā'shŭn* [F. *trépidation*—from L. *trepidātĭō* or *trepĭdātĭōnem*, trembling, fear—from *trepĭdus*, agitated, trembling]: a quaking or quivering from fear or terror; a state of confused hurry or alarm. TREP'ID, a. *-ĭd*, shaking; trembling. TREPIDITY, n. *trĕ-pĭd'ĭ-tĭ*, agitation; emotion.—SYN. of 'trepidation': agitation; disturbance; tremor; emotion; fear; alarm; fright.

TRE'R CEIRI: the ruins of an ancient British fortified town situated in the northwestern part of Wales, six miles south of Carnarvon. The surrounding fortifications and substantial stone walls of the Cytian-houses or huts are still standing. An investigation in 1903 disclosed a number of Celtic bronze and iron implements and ornaments, specimens of Celtic pottery, and porcelain beads of Egyptian manufacture, which place the date of the fort at about the 2d century A.D.

TRESCOT, *trĕs'kot*, WILLIAM HENRY: diplomat: b. Charleston, S. C., 1822, Nov. 10; d. 1898, May 4. He graduated at the College of Charleston 1840; was admitted to the bar 1843; appointed secretary of the U. S. legation at London 1852, and assistant secretary of state 1860, June. On the secession of S. C., he resigned and returned home, and served during a part of the war on the staff of Gen. Ripley, and 1862,64,66 in the legislature. In 1875 he removed to Washington to practice law; 1877 was appointed counsel for the United States on the fishery commission; 1880 a plenipotentiary to revise the treaties between the United States and China; 1881 a special commissioner to negotiate a protocol with Colombia concerning the rights of the United States on the Isthmus of Panama, and special envoy to Peru, Chili, and Bolivia; and 1882 a plenipotentiary to negotiate a commercial treaty with Mexico. He published a number of historical works.

TRESPASS, n. *trĕs'păs* [OF. *trespasser*, to exceed, to pass on or over—from L. *trans*, across; *passus*, a step (see PASS)]: transgression generally; any wrong or damage done by one person to another; unlawful entry on the lands of another; a known violation of the moral law; sin: V. to pass over a limit or boundary; hence, to go upon the lands of another unlawfully; to make entry or passage without right or permission; to intrude aggressively or offensively; to violate any known rule or moral duty; to transgress; to intrude; to go too far. TRES'PASSING, imp. TRES'PASSED, pp. *-păst*. TRES'PASSER, n. *-sĕr*, one who trespasses; an offender. TRESPASS OFFERING, among the *Jews*, an offering for some known violation of the divine law.—SYN. of 'trespass, n.': guilt; misdemeanor; offense; transgression; misdeed; iniquity; wrong; injustice; wickedness; injury; breach; infringement.

TRESPASS.

TRES'PASS, in Law: any wrong or injury committed on either the person or property of an individual, not amounting to a crime. It includes a great variety of torts (see TORT). As regards a T. on the person, the more familiar term is an assault (see ASSAULT AND BATTERY) or imprisonment; but T. as to goods and chattels is more commonly known under the names of the remedies applied—e.g., actions of Trover (q.v.), Detinue (q.v.). T. is the technical as well as popular name for that kind of injury to a man's land or house by intruding into it against his will. In the law of England and the United States, the maxim is well known that every man's house is his castle, and he is entitled to treat as an enemy any person who attempts to enter without his leave. There are, however, a few exceptions to this rule of the inviolability of a man's house; for it is no protection against the officers of the law when executing criminal process—e.g., coming to apprehend a person charged with crime. But, as regards mere civil warrants, the officers of the law have no right to break open a man's outer door in order to effect an arrest for debt; and no civil court can give the officer such a power. The officer can only wait outside, or endeavor by some stratagem to enter the house in a peaceable manner; and if once inside the outer door, he can then break his way throughout the house to find his debtor. Such is the law as to intruding into a man's house armed with the authority of the law.

It is a general rule applicable to a man's house as well as land that if a stranger enter without leave, and do not quit at the request of the owner (who is not bound to state any reason for his request), the owner may by force eject the intruder. In doing so, however, he must not use more force than is necessary to overcome resistance offered. If the intruder enter with force, the owner may turn him out without even first requesting him to depart; but if the intruder enter quietly, he must first be requested to leave before hands can be put on him. If, in turning a stranger out, the owner is assaulted by the stranger, the owner may defend himself; but a policeman cannot interfere, or rather it is not compulsory on him to interfere, unless he sees an assault committed by the intruder. Sometimes it is erroneously believed that a person is entitled to go to another's house on lawful business, and insist on admission, and even to remain till he get an answer—e.g., a creditor to demand his money; but this is a mistake: a creditor may be ordered away, and has no more right to intrude than any stranger. It is also sometimes erroneously supposed that any member of the public is entitled to enter into certain public places, e.g., a shop or a theatre; but this is not so. Any shopkeeper can turn any person he pleases, at any moment, out of his shop, and is not bound to deal with any person unless he chooses. So with a keeper of a theatre or other place commonly described as a public place. There is an exception, however, as to an Innkeeper (q.v.) who, is bound, if he have accommodation and the means, to admit a

traveller requiring refreshment. As to all other places, the general rule is, that whoever is the occupier of a house or of land is exclusively entitled to possession, and can extrude any person who refuses on request to leave; or if he prefer to resort to his legal remedy, he can sue such intruder in an action of damages. The amount of damages recovered will depend greatly on the circumstances attending the T., and whether insult or outrage was an accompaniment.—See BREACH (BREACH OF CLOSE).

It is often erroneously believed by the public, as well as by some landlords or occupiers, and it is probably a wholesome delusion, that it is a criminal offense for a stranger to trespass on lands, and that such stranger can be given into custody for doing so; and, to keep up this impression, it is common for landlords or occupiers to post a notice with the words, 'Trespassers will be prosecuted.' But the fact of such a notice, or of there being a fence to the land, makes no difference with regard to the trespasser, who is just as much liable to an action of damages, but to nothing else, for the T., whether he knew or not of such notice; and in neither case can he be given into custody, as for a criminal offense. There is no action at law for a T. unless damage has been done—material damage and not imaginary, for the law does not care for trifles. If, however, a trespasser were to break the trees, or do wilful damage (other than mere walking or riding), he may be liable to be apprehended; and if he is at the time trespassing with intent to catch or kill game, he may in some cases be apprehended and given into custody (see GAME: POACHING).

Not only human beings are trespassers, but the word is by analogy applied to the trespasses also of dogs, cats, and other animals. The trespasses of cattle are often of importance, because of the damage done. The rule of law which governs the rights of occupiers of land on this subject is the following: an owner is not bound to fence his land, and, whether fenced or unfenced, a neighbor is bound neither to trespass himself nor allow his cattle to trespass. If, therefore, A's cattle trespass on B's land, B can impound them—that is, he can lock them up, and keep possession till the owner pay for the damage done; or, if he prefer it, he can bring an action to recover the damages; or he may drive them off, and also bring the action, until by one or other remedy he is satisfied. With regard to dogs, cats, and similar domesticated animals, the rule is, that the owner is merely responsible for such mischief as they commit by reason of some negligence on his part. If, for example, he knows of some bad propensity which they have to stray and attack or damage third persons, then it becomes his duty to take such means as will prevent their doing the mischief; but he cannot be held responsible unless and until the animals have on a former occasion done the mischief—in other words, it is only for a second and not a first offense that he can be made liable.

To guard against T. both of men and of animals, owners of land have sometimes resorted to spring-guns and man-traps, placed in their grounds. This practice was carried

to a great height in England about the middle of the 19th c. In the United States, the law does not authorize the setting of spring-guns, etc.; but in England the courts have decided that there is nothing to prevent an owner from so protecting his land. A statute, however, restricts such right to protection of dwelling-houses and gardens; so that now throughout the United Kingdom it is illegal to place man-traps and spring-guns in open fields. As regards, however, traps to catch dogs, cats, or other animals, an owner of land is entitled to place these in his lands, but must not be placed so close to a highway as to tempt aside a dog lawfully passing along the highway, for the owner of a dog, being entitled to the use of the highway for the dog as well as himself, is entitled to have no danger placed in its way, such as a strong-smelling bait which should operate irresistibly on its animal instincts.

TRESS, n. *trĕs* [F. *tresse,* a tress, a plait—from mid. L. *tricĭa,* a plait—from Gr. *tricha,* threefold: It. *treccia;* Sp. *trenza,* a plait of three bands of hair]: a three-plaited band of hair; a braid or lock of hair; a ringlet. TRES'SES, n. plu. *-sĕz.* TRESSED, pp. *trĕst:* ADJ. having tresses; formed into tresses; curled; knotted. TRESSY, a. *trĕs'sĭ,* abounding in tresses.

TRESSURE, *trĕsh'ūr,* in Heraldry: a subordinary, generally said to be half the breadth of the orle, and usually borne double, and flowered and counter-flowered with fleurs-di-lis. It is part of the royal insignia of Scotland.

TRESTLE, n., or TRESSEL, n. *trĕs'sl* [OF. *trestel,* a trestle: of uncertain origin, perhaps from L. *transtrum,* a transom: comp. Dut. *driestal,* a tripod: W. *trawst,* a rafter]: a frame consisting of a beam or bar fixed at each end to a pair of spreading legs (sometimes strengthened by diagonal braces), used with another or other frames of the same kind for supporting something, as a bridge, a table, or the like; the frame of a table: open braced framework supporting the horizontal stringers of a bridge or other structure. TRESTLE-BOARD, a name applied to the designing-board of a draughtsman.

TRET, n. *trĕt* [Norm. F. *trett,* draught—from L. *tractus,* pp. of *trahĕrĕ,* to draw]: *formerly,* an allowance to purchasers of goods for waste or refuse matter of 4 lbs. on every 104 lbs. after deducting the tare.

TREVAT, n. *trĕv'at* [etym. doubt.]: a weaver's knife for cutting the loops of velvet pile.

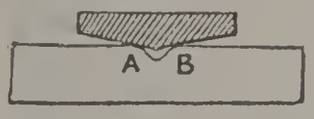
TREVELYAN, SIR CHARLES EDWARD: English statesman: b. Taunton, Somerset, 1807, Apr. 2; d. London, 1886, June 19. He was educated at the Charterhouse and Haileyburg College, and entered the East India Company's Bengal civil service in 1826. He returned to England in 1838, and in 1840 was appointed assistant secretary of the treasury. He was knighted in 1848 for his services during Irish famine, and later, with Sir

Stafford Northcote and others, was instrumental in throwing open the civil service to competition. In 1859 he was appointed governor of Madras, but was recalled in 1860 for having protested against a new system of taxation imposed in India. He became finance minister in India in 1862, and during his administration introduced various fiscal reforms and also promoted the extension of public works. He resigned because of failing health in 1865, and after his return to England engaged in numerous charitable enterprises. He was created a baronet in 1874. He wrote: *Education of the People of Ireland* (1838); *The Purchase System in the British Army* (1867); *Christianity and Hinduism Contrasted* (1882); etc.

TREVELYAN, Sir GEORGE OTTO: English biographer, historian, and politician: b. Rothley Temple, Leicestershire, 1838, July 20. He was educated at Harrow and Trinity College, Cambridge, was for several years in the Indian civil service, sat in the house of commons in 1865-8 as the representative of Tynemouth in the Liberal interest, and in 1868 was returned by the Hawick or Border Burghs. He was appointed a civil lord of the admiralty in Gladstone's administration of 1868, but resigned in 1870 because he disagreed with his colleagues on the elementary education bill. He was prominently identified with the movement for the abolition of the purchase of army commissions, and he was a leading advocate of the electoral reforms effected in 1884-5. In 1880 he accepted the post of parliamentary secretary to the admiralty, and in 1882, after the murder of Lord Frederick Cavendish and Mr. Burke, he went to Ireland as chief secretary to the lord-lieutenant. In 1884 he entered the cabinet as chancellor of the Duchy of Lancaster, and on the formation of Gladstone's short-lived ministry in 1886 he accepted office as secretary of state for Scotland. In the Liberal government of 1892-5 he was secretary for Scotland. He is favorably known as an author by the following works: *The Competition Wallah* (1864), a series of letters on Indian matters reprinted from *Macmillan's Magazine; Cawnpore* (1865); *The Ladies in Parliament, Horace at the University of Athens, and Other Pieces* (1868); *Speeches on Army Reform* (1870); *The Life and Letters of Lord Macaulay* (1876), an admirable biography of his uncle; *The Early History of Charles James Fox* (1880), still unfinished; and *The American Revolution*, 3 vols.

TREVELYAN EXPERIMENT, *tre-vĕl'yan:* experiment in the expansion of metals by heat; named from the person who first carefully studied the phenomenon. When a block of iron or copper is considerably heated, and laid on a block of cold lead, a sound of some intensity, and more or less musical, is often heard. Trevelyan, after many trials, adopted for the upper block or 'rocker,' as it is called, a form somewhat resembling a fire-shovel, with a thickish block of metal instead of the blade: this is poised

delicately on the lead block, so as to bear with nearly equal pressure on two points separated by a groove; and the rounded end of the handle is also supported. The annexed fig. shows a section of the head of the rocker and of the lead block. The rocker being heated, suppose it poised so as to touch the lead at A only. It heats the lead at A, and therefore suddenly expands it near that point, since lead is a poor conductor of heat. Thus, the lead, as it were, swells up at A, and tilts the rocker over to B. There the same process takes place, and so on; and as the rocker thus moves alternately from A to B, the successive impacts, at nearly equal intervals, form a musical sound. This can be altered at pleasure by loading the rocker, or by altering its moment of inertia. By proper care, almost any conducting body may be made thus to rock upon another, though, in the majority of combinations, the effect is very slight. The explanation above is due to Faraday.



TREVES, *trēvz* (Ger. *Trier*, Lat. *Augusta Trevirorum*): town of Rhenish Prussia, cap. of a circle; on the right bank of the Moselle, in a lovely valley between vine-covered hills, about 60 m. s.w. of Coblenz, 86 m. s. of Cologne. The river is here crossed by a bridge of 8 arches, 730 ft. long, 25 ft. wide. T. is a decayed place, and covers an area large in proportion to its population, owing to the number and size of the open spaces where houses formerly stood. The cathedral of St. Peter and St. Helen is a very interesting structure of various antiquity, principally of the early German Romanesque style of the 11th c., but retaining considerable remains in the interior of a previously existing Roman church of the age of Constantine. It has beautiful altars and tombs; rich old chasubles and missals, famous relics, among others the 'Holy Coat' (q.v.). Adjoining the cathedral is the *Liebfrauen-kirche*, a very graceful specimen of Early German Gothic architecture, finished 1243. The only other ecclesiastical buildings of interest now remaining are the chapel of the Benedictine convent of St. Mathias outside the town, and the church of the Jesuits. T. contains some beautiful old dwelling-houses of Romanesque architecture. No place in Germany is so rich in remains of the Roman period. Among these are the *Porta Nigra*, a colossal gateway, probably one of the five gates by which T. was entered in Constantine's time, the so-called Roman baths (more probably part of an imperial palace), and a basilica of Roman brick built by Constantine for a court of justice, which, after being successively the residence of the Frankish kings and archbishops, was mostly demolished to make room for an electoral palace erected 1614; this has recently been removed, and the basilica restored and fitted up as a Prot. church. Beyond the walls are the ruins of an amphitheatre. The piers of the bridge mentioned above, consisting of enormous blocks of lava, also are of the Roman period.

T. is the seat of a bishop, and of a provincial council, has a chamber of commerce, a priestly seminary, gymnasi-

um, a library of 96,000 vols. and numerous MSS., a museum full of valuable antiquities—including the famous *Codex Aureus*, or MS. of the Gospels in gold letters, presented to the abbey of St. Maximin by Ada, sister of Charlemagne—and various benevolent institutions. There are manufactures of woolens, cottons, and linens; also a brisk trade in corn, timber, and Moselle wines.—Pop. (1880) with suburbs 37,431; (1885) town alone 26,125; mostly Rom. Catholics: (1890) 36,162; (1895) 40,026.

T. derives its name from the *Treviri* or *Treveri*, a Gallic or, more probably, Belgic people, who in Cæsar's time inhabited a large tract between the Meuse and the Rhine. Their cap., *Augusta Trevirorum*, became a Roman colony probably in the time of Augustus, and ultimately became the headquarters of the Roman commanders on the Rhine, and a frequent residence of the emperors, particularly Constantine. Under the Franks, into whose hands it fell 463, it continued to flourish. In 843, it passed to Lorraine; in 870, to Germany; in 895, back to Lorraine; and finally was united to Germany by Emperor Henry I. The Abp. of T. was, in virtue of his office of chancellor of Burgundy, one of the electors of the empire, a right which seems to have originated in the 12th or 13th c., and continued till the French Revolution. The ambition and talents of some of these episcopal rulers obtained for them great political weight in Germany. Since 1814, T. has belonged to Prussia.—See Haupt, *T.'s Vergangenheit und Gegenwart* (2 vols. Trier 1822); more recent works by Schmidt, Bärsch, Braun, Leonardy, and Von Wilmovski; also Freeman's *Historical and Architectural Sketches* (1876).

TREVET, n. *trĕv'ĕt*, or TRIVET, n. *trĭv'ĕt* [F. *trépied*, a trivet, tripod—from L. *tripes* or *tripĕdem*, three-footed—from *tres*, three; *pes* or *pedem*, a foot]: a stool or stand supported by three legs; a movable iron frame or stand to support a kettle, etc., on a grate, and keep it from pressing on the coals. RIGHT AS A TRIVET, *familiarly*, all correct; in good health.

TREVISO, *trā-vē'sō:* town of Italy, cap. of the province of T.; on the river Sile, in a very fertile country, 17 m. n. of Venice, with whose lagoons the river communicates by canals. It is the seat of a bishop, and has a handsome duomo, with five cupolas, and with an altar-piece of the Annunciation by Titian; and among other buildings are the old Gothic church of San Nicolo (with some excellent pictures), the public library (30,000 vols.), and a fine theatre. The town is surrounded by a wall 24 to 38 ft. in height, and strengthened by numerous bastions. There are manufactures of hardware, a sugar refinery, a bell-foundry, and paper-mills.—Pop. of town (1901) 33,987.

TREVITHICK, *trĕv'ĭ-thĭk*, RICHARD: 1771, Apr. 13—1833, Apr. 22; b. Illogan, England: mechanical engineer. He became an engineer in the Cornish mines early in life; built several steam-engines containing original improvements; patented a high-pressure steam-engine for use on roads and tramways as motive power 1802; and with an

improved one drew a load of 10 tons at the rate of 5 m. per hour at Merthyr Tydvil 1804, Feb. 21. The accidental blowing up of this engine and the general ridicule of his project delayed the actual introduction of the locomotive engine into England several years. T. resumed mining work in Cornwall and spent several years in mining in Peru, whither he had shipped a number of his small high-pressure condensing engines; but returned to England penniless 1827. He invented a large number and variety of useful articles, but obtained little profit from them.

TREVOR, *trē'vėr*, Sir JOHN, Knight: 1633–1717, May 20; b. England. In the parliament of James II. which met 1685, May 19, he was elected speaker of the house of commons, being a minion of Jeffreys (q.v.), whose bullying style he sometimes imitated. In the same year he was made master of the rolls. He contrived to maintain his political and judicial position after the revolution of 1688, and was again elected speaker 1690, acting also as first commissioner of the court of chancery, in which position, as in the speaker's chair, his greed and venality became notorious. In 1695 his conduct was investigated by a committee of the house of commons; and as a result he was declared guilty of high crime, and was formally expelled, though he retained the mastership of the rolls.

TREY, n. *trā* [OF. *trei;* L. *tres*, three]: a three at cards or dice; a card of three spots.

TRI-, *trī* [Gr. *treis*, three; *tris*, thrice: L. *tres*, three]: a common prefix in scientific terms, signifying *thrice*, or *in threes*—as in *tri*partite, divided into three parts; *tri*lobate, three-lobed.

TRIABLE, a. *trī'ă-bl* [see TRY]: that may be subjected to trial or test; that may undergo a judicial examination. TRI'ABLENESS, n. *-nĕs*, the state of being triable.

TRIACONTAHEDRAL, a. *trī'ă-kŏn'tă-hē'drăl* [Gr. *triakonta*, thirty; *hedra*, a seat, a base]: having thirty sides; bounded by thirty rhombs.

TRIAD, n. *trī'ăd* [Gr. *trias* or *triăda*, the number three —from *treis*, three: F. and It. *triade*]: a union of three; three objects or subjects which may be connected more or less—e.g., Creation, Redemption, and Resurrection, or Romans, Saxons, Normans: in *music*, the common chord, consisting of a tone with its third and fifth: in *chem.*, an element which combines with three atoms of a monad element (see VALENCY). HINDU TRIAD (see TRIMURTI). TRIADIC, a. *trī-ăd'ĭk*, pertaining to a triad.

TRIADELPHOUS, a. *trī'ă-dĕl'fŭs* [Gr. *treis*, three; *adelphos*, a brother]: in *bot.*, having stamens united in three bundles by their filaments.

TRIAL, n. *trī'ăl* [from TRY, which see]: any effort or exercise to ascertain what can be done; an attempt; an endeavor; examination by test or experiment; experience; any suffering or temptation that puts strength or virtue to the test; affliction; the formal examination before a judge (and usually a jury) by means of witnesses in a court of law, as to whether certain alleged facts or charges are true or un-

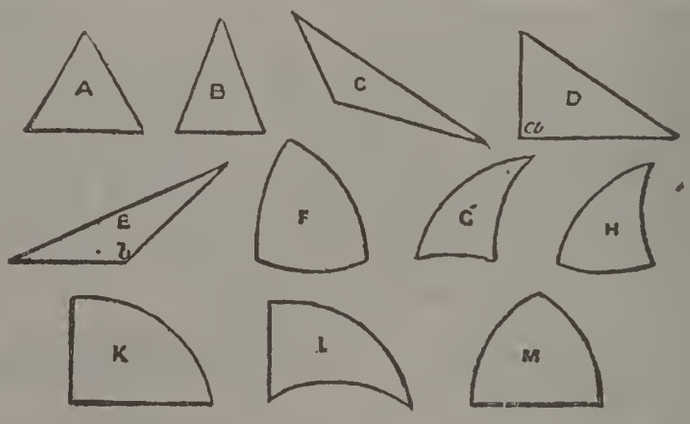
true. TRIAL AT BAR, a jury trial before the full court of four judges—a procedure seldom resorted to.—SYN. of 'trial': effort; attempt; endeavor; essay; experiment; exertion; test; proof.

TRIALITY, n. *trī-ăl'ĭ-tĭ* [formed from a supposed *trial*, composed of three (in imitation of *duality*, from *dual*, composed of or pertaining to two)—from L. *tri-*, three, and *-ity*, a terminative denoting state or condition]: threefold character or state; threeness. [Rare.]

TRIAMINE, n. *trī'ăm-ēn* [Gr. *treis*, three; Eng. *amine*]: in *chem.*, an amine containing three atoms of nitrogen, or derived from three molecules of ammonia.

TRIANDRIAN, a. *trī-ăn'drĭ-ăn*, or TRIAN'DROUS, a. *-drŭs* [Gr. *treis*, three; *anēr* or *andra*, a man]: in *bot.*, having three distinct and equal stamens, as in the class TRIAN'DRIA, n. plu. *-drĭ-ă*.

TRIANGLE, n. *trī-ăng'gl* [F. *triangle*—from L. *trian'gŭlum*, a triangle—from L. *tres*, three; *angŭlus*, a corner, an angle]: plane figure bounded by three lines, having three corners or angles; anything in the form of a triangle; a musical instr. of percussion, made of metal, and struck while hanging free; so called from its shape. TRIAN'GLED, a. *-gld*, having the form of a triangle; formed into triangles. TRIAN'GULAR, a. *-gū-lĕr*, having the form of a triangle; relating to a triangle. TRIAN'GULARLY, ad. *-lĭ*. TRIAN'GULAR'ITY, n. *-lăr'ĭ-tĭ*, quality of being triangular. TRIAN'GULATE, v. *-lāt*, to divide into portions in the form of triangles for surveying; to make triangular. TRIAN'GULATING, imp. TRIAN'GULATED, pp. TRIAN'GULA'TION, n. *-lā'shŭn*, division of a district of country into portions in the form of triangles for convenience of accurate measurements (see below). TRIANGULAR COMPASSES, compasses with three legs for taking and laying off three points at once. TRIANGULAR NUMBERS: see FIGURATE NUMBERS.—*Triangles* are classed according to the relative length of their sides, as *equilateral* (A), or equal-sided;



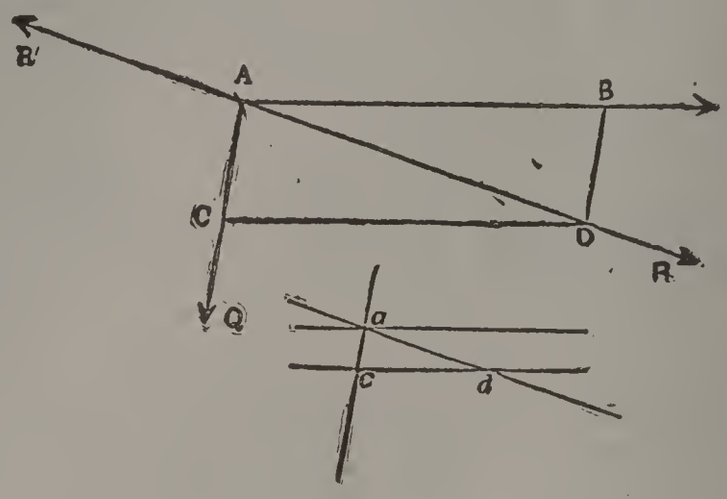
Triangles.

isosceles (B), or having two sides equal; and *scalene* (C), or unequal-sided, the equality or inequality of the sides carrying with it the equality or similar inequality (of *greater* or *less*) of the angles respectively opposite to these sides, though the *ratio* of inequality of the sides not at all corre-

sponds to that of the angles. Considered with reference to the size of its angles, a triangle is *right-angled* (D) when one of its angles (a) is a right angle (90°); *obtuse-angled* (E), when it has one angle (b) greater than a right angle; and *acute-angled* (A or B), when it has no angle so great as a right angle. For the relations between the sides and angles of a triangle, see TRIGONOMETRY. The triangle being the fundamental figure of plane geometry, through which the properties of all other figures have been arrived at, the investigation of its properties has always been held of primary importance. The lines joining the angles of a triangle with the points of bisection of the opposite sides, intersect at the same point, as also do the perpendiculars from the angles on the opposite sides, the lines bisecting the angles, and the perpendiculars from the middle points of the sides. The point of intersection of the first series of lines is the centre of gravity of the triangle; those of the third and fourth series are the centres of two circles, the former of which touches the sides internally, and the latter passes through its three angular points. Another remarkable property of triangles, known as Napoleon's problem, is as follows: if on any triangle three equilateral triangles be described, and the centres of gravity of these three be joined, the triangle thus formed is equilateral, and has its centre of gravity coincident with that of the original triangle. See TRIGONOMETRY; HYPOTENUSE. The area of a triangle is half of that of a parallelogram which has the same base and altitude, and is thus equal to half the product of the base into the altitude; it may be expressed also by the formula $\sqrt{S(S-a)(S-b)(S-c)}$, where a, b, c, are the lengths of the sides, and S is half their sum. A *spherical* triangle is bounded by arcs of three great circles of the sphere. The sum of the angles of a spherical triangle is always greater than 180° and less than 540°.

TRIAN'GLE OF FORCES: in mechanics, a proposition which is merely a formal modification of the *Parallelogram of Forces* (q.v.), and as generally stated, is its converse. The parallelogram of forces enunciates that, if two forces, P and Q (fig.)—represented in direction and magnitude by AB and AC—inclined at an angle to each other, act on a point A, their resultant, R, is represented in direction and magnitude by the diagonal, AD, of the parallelogram formed on the two lines AB and AC. Now, as the resultant, R, is equivalent to the combined action of P and Q, it would exactly counterbalance them if acting in the opposite direction AR′, but would still be fully represented by the diagonal line AD. Also, instead of AB, CD may be taken to represent P. Hence as the sides of the triangle ACD represent the three forces, we have the proposition, *that if three forces in the same plane be in equilibrium on a particle, and if in that plane any three mutually intersecting lines be*

drawn parallel to the directions of the forces, the lengths of the sides of the triangle thus formed will be proportional to the magnitudes of the forces. Its proof rests on the previously ascertained fact, that R′, P, and Q, three equilibrating forces at A, are proportional to AD, CD, AC; and on the geometrical theorem, that a triangle whose sides are respectively parallel to those of another triangle, has its sides



proportional to those of the latter; consequently, the ratio and relative direction of the forces R, P, and Q, are fully represented by *ad*, *cd*, and *ac*, the sides of the triangle *acd*. Again, as the sides of a triangle are to one another as the sines of the opposite angles, so also are the forces which the sides represent. Hence

P : Q : R′ : : CD : AC : AD
: : sin. CAD : sin. ADC : sin. ACD
(and substituting the sines of the supplementary angles)
: : sin. QAR′ : sin. PAR′ : sin. PAQ;

that is, each force is proportional to the sine of the angle between the directions of the other two.

TRIANGULA'TION: operation of dividing any portion of the earth's surface into triangles of as large size as possible, which may be called primary, and which must be afterward subdivided into smaller triangles, forming a great network of secondary or subsidiary triangles, which serve as a means of working down from great to less, and finally completing, by a system of scientific checks, an accurate map or delineation of the region covered by such triangles, forming the geodesical process called a trigonometrical survey: see TRIGONOMETRICAL SURVEY: ORDNANCE SURVEY: GEODESY. The same operation is used in the measurement of an arc of the meridian for ascertaining the length of a degree of latitude or longitude on any part of the earth's surface; but in this case, only primary triangles are necessary, as no topographical detail is required, and the positions of the apexes of the triangles are astronomically fixed in the most careful manner, which is not always done in the triangles of a trigonometrical survey.

In carrying out a system of T., much judgment and an accurate local knowledge of a country are necessary; and

it often happens that a more extensive range of angles can be obtained from a comparatively low station than from the tops of the highest mountains. The angles of each triangle should be as near equal as possible, and unless local circumstances render it unavoidable, very acute or obtuse angles should not be used. The sides of the primary triangles should be as long as can be conveniently observed, but in practice they vary from 80 m. or more to 4 m., or even less. The angles are generally determined by a large theodolite, of as simple and strong construction as possible, fixed on the most elevated points of mountain-ranges, etc. When the apexes of the triangles are very distant, heliostats, or mirrors reflecting the sun's rays, are often used, and in dark or cloudy weather the Drummond light has been employed. The primary triangles being fixed on the spherical surface of the earth, certain formulæ, according to the rules of spherical trigonometry, must be applied to reduce them to the simple calculations for ascertaining, from certain known data, the sides and angles of plane triangles. The whole of those calculations are dependent on the accurate measurement of a base or fundamental line. The length of base-lines used in modern surveys varies from 3 to 7 m. At the end of a large T., a second or testing base-line is always measured at a distance from the original one; if the measured length of this agrees with that ascertained by calculation, it may be considered a proof of the accuracy of the work in general.—See art. 'Celestial Measurings and Weighings,' by Sir John Herschel, *Good Words* (1864).

TRIARCHY, n. *trī'ȧr-kĭ* [Gr. *treis*, three; *archē*, government]: government by three persons.

TRIAS, n. *trī'ăs*, or Triassic System, *trī-ăs'sĭk* [Gr. *trias*, the number three, a triad]: in *geol.*, a triple series, the oldest of the Mesozoic period, formerly associated with the Permian rocks under the name New Red Sandstone (q.v.), so called by German geologists because they are separable into three distinct formations: the Keuper, Muschelkalk, and Bunter Sandstein; and the name has been generally adopted, as the beds are more fully developed in Germany than elsewhere. The German beds have consequently been accepted as types of the group. The typical beds are divided into—1. Keuper (q.v.), with a maximum thickness of 1,000 ft.; 2. Muschelkalk (q.v.), with a maximum thickness of 600 ft.; 3. Bunter Sandstein (q.v.), with a maximum thickness of 1,500 ft.—In the United States, the Jurassic is distinct in the far west, but in the east, where the red sandstone occurs from the Connecticut river valley southwestward, the Trias is not clearly distinguished from the succeeding Jurassic, and hence has been called the Jura-Trias. Trias'sic, a. pertaining to or composed of trias.

TRIATOMIC, a. *trī-ȧ-tŏm'ĭk* [Gr. *treis*, three, and Eng. *atomic*]: possessing or consisting of three atoms.

TRIBASIC, a. *trī-bā'sĭk* [Gr. *treis*, three; *basis*, a base]: in *chem.*, requiring three molecules of base to one of the acid to form a neutral salt: thus, citric acid is *tribasic*.

TRIBE, n. *trīb* [L. *tribus*, a tribe—from *tres*, three, being one of the *three* original great divisions of the Roman people: F. and It. *tribu*, a tribe: Gael. *treubh*, a tribe, a clan]: a family or race existing distinct from others; any class or distinct portion of a people; a number of things having certain common characteristics; a division between order and genus; a group of genera subordinate to an order; a body of rude or savage people under one chief. TRIBAL, a. *trī'băl*, belonging to a tribe. TRI'BALISM, n. *-izm*, the state of tribal existence.

TRIBE: an aggregate of stocks—a stock being an aggregate of persons considered to be kindred—or an aggregate of families, forming a community usually under the government of a chief. The chief is possessed of despotic power over the members of the T. It is commonly said that he has 'patriarchal' power—such power, that is, as fathers in early times exercised over their children. The T. has been the earliest form of the community among all the races of men.

In a very large proportion of existing tribes, the T. is an aggregate of several stocks or distinct bodies of kindred. The persons of whom the T. consists are included in stocks which are, or are accounted, distinct. This organization is sustained by two tribal customs—(1) persons of the same stock are forbidden to intermarry; and (2) kinship is reckoned through females only, so that children are accounted of the stock of their mother. Persons of the same stock, too, owe duties to each other, and are to some extent sharers in each other's liabilities. Thus, an injury done by a man is an injury done by his stock, which may be avenged upon any member of it; an injury done to a man is an injury done to his stock, for which every member of it is bound to seek vengeance. In consequence of the customs above mentioned, a husband must be of a different stock from his wife or wives; he must therefore be accounted of a different stock from his children; and when he has wives of different stocks, their respective children are accounted of different stocks. More than one stock is thus represented in every household; and since a man owes duties to his stock—the duties of acknowledged blood-relationship—while to those of his family who are not of his stock nothing but the accident of birth (only accident) unites him, the family among these tribes has necessarily little cohesion. The tribal customs which have been referred to largely ignore the family; they are founded on the idea of stock. They are the customs of people with whom the conception of stock was a powerful social influence when that of the family was impotent; and it follows that the family, as now existing among these tribes, has *grown* among them. Now, in many cases the only obstacle to its rapid development is the firm hold which the idea of stock has taken of the tribal life. On the other hand, the prevalence of customs founded on the idea of stock proves a prior existence of stocks or bodies of kindred: the separation into stocks must be older than the customs, at least as customs associated with the idea of

stock. And keeping this in view, and considering how difficult it is to conceive of several stocks herding together at the early time when every stranger was an enemy, unless there was some natural connection between them—such a connection as the marriage-law and the system of kinship, when they arose, would establish—it may be concluded that each stock was originally a separate tribe.

This is made the basis of what is called the development theory of the T. (see *Primitive Marriage*, by J. F. McLennan, 1865), which is the theory outlined below. Into the T. conceived of as a single stock, the marriage-law and system of kinship would gradually bring a variety of neighboring stocks; and thus the T. would become what it is—an aggregate of stocks. The progress of such tribes appears to have been from the T. conceived of as a group of kindred to the T. consisting of several stocks or groups of kindred; and now, though the family is not yet fully developed among them, they seem to be tending to become aggregates of families. The tribes of Australasia are the most perfect examples of the organization above described; but it exists (or existed) also among the tribes of N. America and most of those of S. America, among a majority of the known tribes of Africa and a large proportion of the ruder tribes of Asia.

Suppose male kinship (which must come with the growth of the family) introduced among tribes such as have been spoken of, containing different stocks. First, the stocks existing within the T. would be fixed, stereotyped, within it; second, the growth of the family would be greatly promoted, and the influence of the idea of stock proportionately diminished. The family would in time rise to the importance originally possessed by the stock; and at length the T., still divided into stocks, would become, politically, an aggregate of families. The T. would thus assume the exact shape which it had in the early ages of Greece and Italy, when it was an aggregate of families included in clans or bodies considered kindred (*gentes*)—the exact shape which it now has among the most advanced existing tribes. Since the T. of the Australian type might thus develop into a T. of the classical type, is it not probable that the latter really was the result of such a development? Regarded as a hypothesis, this view will be found to fulfil all the conditions of a good hypothesis. And if the circumstances of tribes which have what is popularly termed the marriage-law of caste—among the greatest of which a division corresponding to the Roman *gens* prevails—can be reconciled with it, or with an extension of it, we shall have reached a hypothesis capable of explaining the formation of tribes in general. The tribes above referred to, whether divided into clans or not, consider themselves of a common stock. They restrict marriage to the stock; but they always forbid marriage within certain degrees of relationship; and in numerous cases—among them, those of the most numerous caste peoples—they also forbid marriage within the clan or body considered peculiarly kindred. It will be convenient, for want of a better word, to speak of

this marriage-law as caste. And by caste tribes, in what follows, are meant tribes which have this marriage-law.

Seeing that the law forbidding marriage within the T. (now generally known as the system of *Exogamy*), and the law restricting marriage to the T., have been widely prevalent among human races, both must be conventional, produced by circumstances; and if in their origin they are equally ancient, men, at the first, in respect of their circumstances, must long have been divided into two bodies very differently placed. This, however, is very improbable. There is no evidence for it; there is some evidence against it. The circumstances, too, capable of producing caste must have been isolating circumstances; and it is difficult to conceive of these operating in the earliest times. For various reasons it is probable that caste did not prevail in the earliest times—was not the original law of any tribes. Of these reasons a specimen is found in the law of incest which prevails among the greatest of caste peoples, by which marriage is forbidden, not only within certain degrees of relationship, but also within the clan or body of kindred denoted by a family name. The existence of any law of incest among a caste people requires explanation. But how could a prohibition of marriage within the clan arise among people whose principle it was to marry within the kindred? This can be referred only to circumstances which preceded the origin of caste. Does it not, then, suggest the establishment, through the force of isolating circumstances, of caste—the restriction of marriage to the T. or to particular tribes—among tribes divided into stocks which had forbidden marriage within the stock? This would, at any rate, account for the facts. The original prohibition, on this view, is still represented by the prohibition of marriage within the clan. But as tribes advanced, the family usurped the place of the stock; there sprang up a belief in the common origin of the T.; and the law of succession to family property gave a new importance to near relationships. The law of incest would naturally tend to follow the practically important limits of relationship.—This hypothesis of development is thus capable of connecting together all the varieties of the T., the simplest with the most advanced. Illustrations of this hypothesis are drawn from several different lines of facts, of which the following is one. It is claimed as the received opinion that, among the advanced tribes containing gentes, property was originally vested in the gens, and was only by slow degrees wrested from it by the family. It is involved in this, that at one time the gens was everything, the family nothing, in the organization of the T.; that the family grew, and that, as it grew, the T. sank in importance. The T., when property was exclusively vested in its gentes, must have been an aggregate of gentes, not of families. All this is corroboratory of the hypothesis of development; in particular, it strongly corroborates the view that the T. at an early period consisted of several bodies of kindred, accounted distinct from each other, and each of which held

property in common. It has never been accounted for on any other view.

The only other theory which has been formed of the origin of tribes—and till recently almost universally received—is the patriarchal theory. This, briefly stated, is that a T. consists in the main of the descendants of a single family, descent being chiefly, if not exclusively, reckoned through males; and that the gentes found within the tribe consist of the descendants of individual sons or grandsons of the common progenitor. It is alleged by some that this theory does not explain the organization of the numerous class of tribes first considered. It has been formed on observation of the advanced tribes of the classical type, but it does not consist with the history of property (to test it at a single, but a vital, point) even among them. It might account for property being vested in the T.; it does not account for it being vested in the gentes. It can do so only by the assumption that, though the sons and grandsons of the original progenitor had the desire for family property, and divided his property, or accumulated property of their own, their descendants suddenly lost that desire, and began to hold in common. It is claimed that the patriarchal theory is excluded also in the case of all polyandrous peoples, for that theory assumes that society began with monandric marriage, a perfect idea of the family and male kinship—all conditions the very opposite of those which must at one time have prevailed among such peoples. But this last statement, it must be noted, involves at least as great an assumption as is involved in the theory which it opposes.

TRIBLET, n. *trĭb'lĕt,* or TRIBOLET, n. *trĭb'ō-lĕt* [F. *triboulet*]: a goldsmith's tool used for making rings; a steel cylinder round which metal is bent in the process of forming tubes, nuts, etc.

TRIBOMETER, n. *trĭ-bŏm'ĕ-tĕr* [Gr. *tribein,* to rub; *metron,* a measure]: an instr. for ascertaining the degree of friction in rubbing surfaces.

TRIBONIAN, *trĭ-bō'nĭ-an* (TRIBONIA'NUS, *-ā'nŭs*): eminent Roman jurist of the 6th c.: b. Pamphylia, of Macedonian parentage; died A.D. 545. He held, under Emperor Justinian, the offices of quæstor, master of the imperial household, and consul; but he is famous chiefly through his labors in connection with the Code (q.v.) of Justinian (q.v.) and the Pandects (q.v.).

TRIBRACH, n. *trī'brăk* [Gr. *treis,* three; *brachus,* short]: in *poetry,* a foot of three short syllables, two of which belong to the thesis and one to the arsis, or *vice versa.*

TRIBULATION, n. *trĭb'ū-lā'shŭn* [F. *tribulation*—from mid. L. *tribulātĭō* or *tribulātĭōnem,* distress—from *tribŭlum,* a sledge for rubbing out corn, consisting of a broad beam of wood studded underneath with sharp pieces of flint or with iron teeth, used in threshing grain: literally, a thresher]: that which occasions distress or vexation; severe affliction; great grief, sorrow, or suffering.

TRIBUNE, n. *trĭb'ūn* [L. *trĭbūnus,* the chief of a tribe, a commander—from *tribus,* a tribe: It. *tribuno:* F. *tribun*]: among the *anc. Romans,* an officer or magistrate chosen by the people to protect them from the oppression of the nobles, and to defend their liberties (see ROME—Ancient Italy; also PLEBEIAN; PATRICIAN); a rostrum or elevated platform from which speeches are delivered, as in the French assembly. TRIB'UNARY, a. *-ū-nă-rĭ,* of or pertaining to tribunes. TRIB'UNESHIP, n. *-shĭp,* the office of a tribune; also TRIB'UNATE, *-ūn-āt.* TRIBUNAL, n. *trī-bū'năl* [L. *tribūnal,* a raised platform on which the seats of magistrates were placed: F. *tribunal:* It. *tribunale*]: a bench or raised seat of a judge; a court of justice. TRIBUNITIAL, a. *trĭb'ū-nĭsh'ăl,* or TRIB'UNI'CIAN, a. *-ăn,* pertaining to tribunes; suiting a tribune.

TRIBUTE, n. *trĭb'ūt* [L. *trĭbūtum,* a stated payment —from *tribŭō,* I allot, I bestow—from *tribus,* a tribe: It. *tributo:* F. *tribut*]: a stated sum or a valuable consideration of some kind paid annually by a conquered or subject state to a superior as an acknowledgment of submission, or as a price for peace or protection; a personal contribution; anything given as a token of esteem. TRIB'UTARY, a. *-ū-tėr-ĭ,* paying tribute; subject or subordinate; yielding supplies of anything: N. a state that pays tribute to a superior; any stream which, directly or indirectly, contributes water to another stream. TRIB'UTARINESS, n. *-nĕs,* state of being subject or tributary. —SYN. of 'tribute': tax; impost; rate; duty; custom; assessment; cess; due; toll; charge; levy; subsidy.

TRICAPSULAR, a. *trī-kăp'sū-lėr* [L. *tres,* three; *capsŭla,* a little chest]: in *bot.,* having three capsules.

TRICE, n. *trīs* [Sp. *tris,* noise made by the breaking of glass, an instant: comp. Scot. phrase 'in a *crack*']: an instant; a moment; a very brief space of time; a 'jiffy.' WITHIN or IN A TRICE, in a very short time.

TRICE, v. *trīs* [Sw. *trissa;* Norw. *triss;* Dan. *tridse,* a pulley: Low Ger. *drysen,* to hoist]: to hoist aloft; to haul up and secure by means of a small rope. TRIC'ING, imp. TRICED, pp. *trīst.*

TRICENNIAL, a. *trī-sĕn'nĭ-ăl* [L. *tricēni,* thirty at a time, thirty each; *annus,* a year]: belonging to or noting the number thirty; occurring once in thirty years. TRICEN'TENARY, n. *-tĕ-nėr-ĭ* [L. *tricenti,* three hundred]: a period or space of three hundred years; a day commemorative of any event which took place three hundred years before: also TERCENTENARY (q.v.).

TRICER'ATOPS: a gigantic armored dinosaur found fossil in the Upper Cretaceous rocks of Wyoming. It was larger than a modern rhinoceros, and had three great horns upon the skull.

TRICEPS, n. *trī'sĕps* [L. *tres*, three; *caput*, a head]: in *anat.*, the three-headed extensor muscle of the arm.

TRICH'ECUS. See MORSE.

TRICHIASIS, n. *trĭ-kī'ă-sĭs* [Gr. *thrix* or *tricha*, hair]: a disease of the eye in which some of the hairs of the eye-lash turn in upon the eyeball and produce irritation, the other hairs retaining their natural position. This disease is exceedingly common among the lower classes, especially of the Irish. This affection causes great annoyance, by exciting a pricking sensation, and a constantly irritable and watery state of the eye. The treatment consists in plucking out the offending hairs (if they are few) from time to time, each hair being removed by hair-forceps with a slow steady pull. If they form a little group, they must be removed by dissecting out the small portion of lid in which they are implanted, and uniting the wound with a suture. In other cases it may be necessary to remove the entire margin of the lid.

TRICHIDIUM, n. *trĭ-kĭd'ĭ-ŭm* [Gr. *thrix* or *tricha*, hair; *eidos*, resemblance]: in *bot.*, a filamentous organ resembling a netted purse, in which the spores of certain fungi are included.

TRICHINA, n. *trĭ-kī'na*, plu. TRICHI'NÆ, *nē* [Gr. *thrix* or *tricha*, hair]: a minute parasite or worm, infesting, in the adult state, the intestinal canal, and in its larval state the muscular tissue, of man and certain mammals, especially the hog: more fully called *Trichina Spiralis* (q.v.). TRICHINIASIS, n. *trĭk'ĭ-nī'a-sĭs*, or TRICH'INO'SIS, n. *-ĭ-nō'-sĭs*, disease produced by trichinous meat; the disease of trichinous meat (see below). TRICH'INOUS, a. *-ŭs*, producing or produced by trichinæ; relating to the disease trichiniasis.

TRICHINA SPIRALIS, *trĭ-kī'na spī-răl'ĭs:* peculiar nematoid worm, which, in its sexually immature state, inhabits the muscles, usually of the pig. It was discovered 1835—the demonstrator of anatomy at St. Bartholomew's Hospital, London, giving to Prof. Owen four microscopic specimens of speckled muscle from a subject then in the dissecting-rooms. Paget, then a first-year's student, simultaneously investigated the question, and read a paper on the subject to the Abernethian Society a week before Prof. Owen's memoir was read to the Zoological Society. Prof. Owen, to whom the discovery of the trichina spiralis is generally referred, in communicating to the Zoological Society his 'Description of a Microscopic Entozoon infesting the Muscles of the Human Body,' describes the speckles as capsules containing a spirally-coiled microscopic worm. To this worm he gave its name, trichina spiralis. From the date of this discovery to the present time, the trichina spiralis has been a source of discussion. In 1845, the idea was advanced by various naturalists that it was the unde-

veloped or sexless form of some other worm; and 1855 (after the transformation of the cysticercus into the tapeworm was discovered), various suggestions were made on this subject; but it was not till 1860 that Virchow and Leuckart, by feeding animals on flesh containing trichinæ, arrived independently at the correct conclusion, that the parents of the encysted trichinæ are small nematoid worms, which had never previously been described, Leuckart's experiments being made with human flesh containing these parasites.

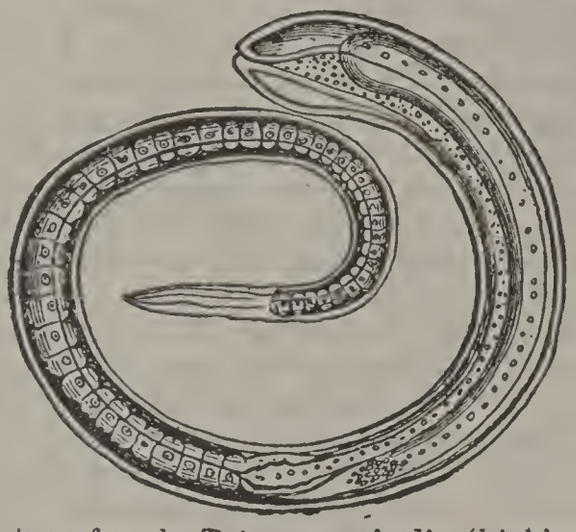
The young trichinæ, as they are seen in the human muscles, present the form of spirally-coiled worms, in the interior of small, globular, oval, or lemon-shaped cysts, which appear as minute specks scarcely visible to the naked eye. These cysts are more or less covered externally with calcereous matter, according to the time during which they have remained fixed, and the degree of degeneration which their walls have undergone. The trichina spiralis measures, according to Cobbold, on an average $\frac{1}{78}$ of an inch in length, and $\frac{1}{130}$ of an inch in breadth. The cysts are sometimes altogether absent; hence they must be regarded as abnormal formations, resulting from local inflammation set up by the presence of the worm, which in this larval condition of existence measures $\frac{1}{25}$ of an inch in length, and $\frac{1}{630}$ of an inch in breadth. These larval worms show a well-marked digestive apparatus, and reproductive organs often sufficiently developed to enable the observer to determine the sex. The number of larval trichinæ that may simultaneously exist in the muscles of a single man or animal is enormous. Dr. Cobbold believes that there can be no doubt that the number in a single 'bearer' (as he terms the sufferer) may *actually* amount to at least 20,000,000.

Fig. 1. — Trichina lying coiled up in muscle, the outside of the cyst supporting fatty tissue, vessels, etc. (magnified).

We proceed to consider the mature worms. When an animal is fed with flesh containing the larval worm above described, and is killed a few days afterward, a large number of minute worms are found mixed with the contents of the small intestines. On closer examination, they are found of two kinds—the larger and more numerous ones being the females, and the smaller and rarer ones the males. At the second day after their introduction, these intestinal trichinæ attain full sexual maturity; and in six days, the females contain perfectly developed and free embryos in their interior.

The female is a slender round worm, varying in length from $\frac{1}{12}$ to $\frac{1}{8}$ of an inch. The anterior end presents a bead-like appearance, from which the intestinal canal

proceeds. The posterior three-fourths are mainly occupied by the reproductive organ, which is filled partly with free embryos, and partly with eggs in various stages of maturity. When these embryos have attained their full size they pass out and commence life on their own account. They are little worms with rounded ends, and present no indications of any internal organs. The male worm is seldom more than two-thirds the length of the female. It presents the same bead-like arrangements as the female, and reproductive organ whose aperture apparently coincides with the anus; while the female sexual aperture is comparatively near the head-end of the worm. The body terminates with two hooks, doubtless subsidiary to the reproductive process. The males are less numerous and shorter-lived than the females, and probably die after having discharged their natural function. The females continue bringing forth young for two or three weeks. The embryos, according to Leuckart, Cobbold, and other helminthologists, penetrate the walls of the intestines, and pass directly into the muscles of their 'bearers' or 'hosts,' where, if the con-



Sexually mature female *Trichina spiralis* (highly magnified).

ditions are otherwise favorable, they are developed into the form originally observed by Owen and Paget. In this way, by proceeding along the course of the intermuscular connective tissue, some reach the muscles of the extremities and other distant parts; but the majority of the wandering embryos remain in the sheathed muscular groups which are nearest to the abdominal cavity, especially in those which are smaller and most supplied with connective tissue. These embryos penetrate into the interior of the separate muscular bundles, and in the course of 14 days acquire the size and organization of trichina spiralis. The surrounding tissues soon become disorganized, and the spot inhabited by the coiled-up worm is converted into a spindle-shaped widening, within which the previously described cyst is formed by a hardening and calcification of the exterior. A point of great

importance in relation to the distribution of this parasite, and as having a practical bearing on the disease known as *Trichiniasis,* has been established by the experiments of Davaine—viz., that while in the adult condition, trichinæ perish in cold water in about an hour, and cannot survive the decease of their host more than six hours, the larvæ remain alive in water for a month, and will live for a long time in flesh which has become putrid. In this way, 'a carcass near a marsh or rivulet may communicate the parasites to the ruminants that drink the water, or to pigs.'

How the pig acquires its trichinæ is unknown; but that the larval trichinæ contained in putrid flesh, etc., may easily gain admittance to the pig's alimentary tract, is a supposition entirely probable. Beet-root, earthworms, moles, and rats have been suggested as their infectors; but on this subject see the advice given by the French commissioners, under TRICHINIASIS. The adult trichina spiralis is liable to infest the intestinal canal of all animals in which the larvæ have been found in the muscles. In this category must be placed man, the dog, cat, rabbit, rat, mouse, mole, hedgehog, and badger. Whether birds ever contain trichinæ is doubtful; reptiles and fishes are free from this parasite.

TRICHINIASIS, *trĭk-ĭ-nī'a-sĭs:* diseased condition induced by ingestion of food containing *Trichina spiralis* in large quantity. The first symptoms in the human subject are loss of appetite, followed by nausea and a sense of fatigue, prostration, and general indisposition: this stage lasts about a week. Pain and stiffness of the limbs, accompanied by swelling of the face, and fever of a peculiar type, characterized by very frequent pulse, moderate thirst, and copious perspirations, now show themselves; the beginning of the second stage being thus synchronous with the migration of the trichina-brood into the muscles, there to become encysted. During this stage, pressure, or any attempt to move the parts under the control of the swollen muscles, is intensely painful, and even the normal respiratory movements cause such constant pain as to render sleep impossible. In severe cases, the patient lies on his back like a paralyzed person. The tongue is coated, the bowels are usually constipated, though sometimes there is diarrhea. In about the fourth week of the disease, the trichinæ may be regarded as permanently settled, and as having completed their destructive action on the muscles. This is the beginning of the third stage, characterized mainly by extreme weakness. The gastric symptoms abate, the appetite returns, and, in favorable cases, the muscular pains and swelling gradually diminish. In severe cases, this third stage is the most dangerous part of the disease; the diarrhea being severe, and accompanied with tenesmus, and often with involuntary discharges of the fæces and urine, while the skin exhibits extreme pallor,

and is enormously distended with effused serum. Moreover, pneumonia often supervenes at this period. The fourth and last stage is that of convalescence. This may begin at the fifth week, or later, and may last from three weeks to three months. In mild cases, it is impossible to draw a definite line between this and the preceding stage. Death may occur at any period. It has been observed as early as the 5th, and as late as the 42d day of the disease. A single trichinous pig, if its flesh is eaten without being sufficiently cooked to destroy the vitality of the larval trichinæ, may establish a local epidemic of this disease.

TRICHOCEPHALUS, *trĭk-ō-sĕf'ā-lŭs* [from Gr. *thrix*, gen. *trichos*, a hair; *cepale*, the head]: genus of intestinal worms, of which one species, *T. dispar* (described by the older writers, who mistook its head for its tail, as *Trichiuris* and *Ascaris trichiura*), infests the human intestinal canal. Cobbold describes it as a small nematoid worm, the male 1½ inches long, and the female fully 2 inches: it is characterized by an extremely long hair-like head and neck, occupying about two-thirds of the entire length. The presence of this parasite is attended with little or no inconvenience. Its development and mode of access into the body are not yet clear. The eggs are not developed within the host's intestines, but are discharged *per anum*, in the immature condition in which they escape from the parent; and it further appears that after their expulsion a period of several months must elapse before embryonic formation commences. As in the more common instance of *Ascaris lumbricoides*, it is probable that they complete their development in open water.

TRICHOGENOUS, a. *trĭ-kŏj'ĕ-nŭs* [Gr. *thrix* or *tricha*, hair; *gĕnnăō*, I produce]: productive of hair.

TRICHOGYNE, n. *trĭk'ō-jĭn* [Gr. *thrix* or *tricha*, hair; *gunē*, a woman]: a receptive organ concerned in the sexual reproduction of certain algæ.

TRICHOLOGY, n. *trī-kŏl'ō-jĭ* [prefix *tricho-*; Gr. *logos*, a discourse]: the study of human hair, with a view to the prevention of baldness. TRICHOLOG'ICAL, a. *trĭk-ō-lŏj'-ĭk-ăl*, of or pertaining to trichology. TRICHOLOGIST, n. *trī-kŏl'ō-jĭst*, one who makes a scientific study of hair.

TRICHOME, n. *trĭk'ōm* [Gr. *trichōma*—from *thrix* or *tricha*, hair]: in *bot.*, any structure, such as hair, originating as an outgrowth of the epidermis.

TRICHOPTERA, n. *trī-kŏp'tĕr-ă* [Gr. *thrix* or *tricha*, hair; *ptera*, plu. of *pteron*, a wing]: a sub-order of neuropterous insects; the caddis-flies (see CADDICE). TRICHOP'TERAN, a. *-tĕr-ăn*, or TRICHOP'TEROUS, a. *-ŭs*, hair-winged, as the caddis or case-worm flies.

TRICHORD, n. *trī'kawrd* [Gr. *treis*, three; *chordē*, a string]: a three-stringed lyre: ADJ. having three strings; said of an improved pianoforte, each note of which has three strings for the greater part of its compass.

TRICHOTOMOUS, a. *trī-kŏt'ō-mŭs* [Gr. *tricha*, in three parts; *tomē*, a cutting]: divided into three parts or into threes. TRICHOT'OMY, n. *-mĭ*, division into three parts.

TRICK, n. *trĭk* [Dut. *trekken*, to pluck, to draw; *trek*, a trick: Ger. *streich*, a stroke, a trick: F. *tricher*, to cheat: in meaning 'to dress or adorn,' perhaps from W. *trec*, gear, harness]: any fraud or underhand scheme to impose upon others; something done to cheat or deceive; a vicious practice; practice or habit, as, 'he has a *trick* of winking;' a sly artifice by way of amusement; a frolic; the dexterous artifice of a juggler; a parcel of cards falling to a winner at one round of play: in *sailors' slang*, a spell of work, as at the helm; a turn; a shift: in *her.*, mode of representing arms by sketching them in outline, and appending letters to express the tinctures, and sometimes numerals to indicate the repetition of changes: V. to deceive; to impose on; to defraud; to dress or adorn fantastically, with *out*, as, 'she was *tricked out* in all her finery.' TRICK'ING, imp.: ADJ. cheating; deceiving; defrauding: N. in *OE.*, dress; ornaments. TRICKED, pp. *trĭkt*. TRICKER, n. *trĭk'ĕr*, one who cheats; also TRICK'STER, n. *-stĕr*. TRICK'ERY, n. *-ĕr-ĭ*, artifice; deceit; the art of dressing up fantastically. TRICK'ISH, a. *-ĭsh*, given to deception and cheating. TRICK'ISHLY, ad. *-lĭ*. TRICK'ISHNESS, n. *-nĕs*, quality of being trickish or deceitful. TRICK'Y, a. *-ĭ*, artful; cunning. TRICK'INESS, n. *-ĭ-nĕs*, quality of being tricky. TRICKSY, a. *trĭk'sĭ*, very artful; full of tricks; elegantly quaint. TRICK'SINESS, n. *-nĕs*, artfulness; playfulness: quaintness.—SYN. of 'trick, n.': stratagem; fraud; wile; cheat; juggle; finesse; imposition; delusion; imposture; deception; sleight; artifice; subterfuge; antic.

TRICKLE, v. *trĭk'kl* [W. *treiglo*, to roll or trickle: Scot. *trigil*, to trickle: Dan. *trille*, to roll]: to flow in drops or in a small intermittent stream; to run gently down. TRIC'KLING, imp. *-klĭng:* ADJ. flowing in a small gentle stream: N. the act of flowing in a small gentle stream. TRICKLED, pp. *trĭk'kld*.

TRICK-TRACK, n. *trĭk-trăk* [F. *trictrac*, backgammon]: a game at tables—resembling backgammon.

TRICLINIC, a. *trī-klĭn'ĭk* [Gr. *tris*, thrice; *klinō*, I bend]: having three unequal axes intersecting at oblique angles, applied to a system of crystallization; inclining or bending in three different directions; also called TRICLINOHED'RIC, a. *-klī-nō-hĕd'rĭk* [Gr. *hedra*, a seat].

TRICLINIUM, n. *trī-klĭn'ĭ-ŭm* [L.—from Gr. *tris*, thrice; *klinō*, I bend]: in *anc. Rome*, a couch to recline on at meals, usually for three persons; a dining-room furnished with couches on three sides. TRICLI'NIARY, a. *-nĭ-ĕr-ĭ*, pertaining to the ancient mode of reclining at table.

TRICOCCOUS, a. *trī-kŏk'kŭs* [*Gr. treis*, three; *kokkos*, a kernel or berry]: in *bot.*, having three one-seeded cells.

TRICOLOR, or TRICOLOUR, n. *trī'kŭl-ėr* [L. *tres*, three, and Eng. *color:* F. *tricolore*, of three colors]: a national banner of three colors. TRI'COLORED, a. *-kŭl-ėrd*, having three colors.—*Tricolor* is simply a flag in three colors; and most national ensigns are of this kind; but the applied sense limits it to flags having three colors in equal masses. The principal T. ensigns are: France—blue, white, red, divided vertically, blue next the staff. German empire—black, white, red, divided horizontally. Italy—green, white, red, divided vertically. Belgium—black, yellow, red, divided vertically. Holland—red, white, blue, divided horizontally. The tricolor took its rise at the outbreak of the French Revolution as the badge of the National Guard. The red and blue were selected as the arms of Paris, and the white was added, as the color of the army, to show the intimate union which should subsist between the people and the armed force.

TRICORNIGEROUS, a. *trī'kŏr-nĭj'ėr-ŭs* [L. *tres*, three; *cornu*, a horn; *gero*, I bear]: having three horns.

TRICOSTATE, a. *trī-kŏs'tāt* [L. *tres*, three; *costa*, a rib]: in *bot.*, three-ribbed.

TRICOUPIS, . *trē-kōō'pĭs*, SPIRIDION: modern Greek statesman and author: 1791–1873; b. Missolonghi; son of a primate of that town. After completing his studies in France and England, he went to the Ionian Isles; but on the outbreak of the war of independence 1821, he hastened to enrol himself among the patriots. During the reign of King Otho, he was thrice sent to London as envoy-extraordinary; he was minister of foreign affairs and of public instruction (1843); vice-president of the senate (1844–49); and envoy-extraordinary to Paris (1850) on the occasion of the blockade of the ports of Greece by Great Britain.

T. had great reputation in his own country as orator and historian. His funeral oration on his friend Lord Byron, in the cathedral of Missolonghi, has been translated into most European languages. He published many other writings, political and religious; but his masterpiece is his History of the Greek Revolution (*Historia tes Hellēnikēs Epanastaseos*, Lond. 1853–4), praised for its accuracy, impartiality, and style.

TRICUSPID, a. *trī-kŭs'pĭd* [L. *tres*, three; *cuspis*, a point]: having three summits or points. TRICUS'PIDATE a. *-pĭ-dāt*, having three points; ending in three points.

TRICYCLE, *trī'sĭ-kl:* a 3-wheeled carriage: specifically a Velocipede (q.v.) with three wheels, invented by James Starley, of Coventry, Eng., the 'father' of the Bicycle (q.v.). The rear wheels are of uniform size, and the front or pivotal wheel is generally much smaller. The T. is adapted particularly to ladies' use, though its use by men is increasing; and remarkable records have been made with it in Great Britain and in the United States. The best single T. record for 5 m. was made in London 1890, June 25, by G. Turner, 13 min. 50⅘ sec.; and the best tandem T. in London 1890, June 20, by Wilson and Dangerfield, 13 min. 54⅕ seconds.

TRIDACNIDÆ, *trī-dăk'nĭ-dē:* family of lamelli branchiate mollusks, having the shell open, the valves equal, the foot small, and furnished with a byssus. *Hippopus maculatus*, the BEAR'S PAW CLAM (q.v.), is prized for its beauty. *Tridacna gigas* is remarkable for great size, exceeding any other bivalve: the shell of a single specimen has been known to weigh more than 500 lbs., and to measure a yard or more in length. Some, 2 ft. or more, are often seen outside of restaurants in New York and other cities. The valves are sometimes used in Rom. Cath. churches for holy-water vessels. They are used also as an ornament for grottoes and fountains. They are deeply furrowed and beautifully grooved. This great mollusk is a native of the E. Indies, and is found in shallow water: it is used for food, and one suffices for a number of persons.

TRIDACTYLOUS, a. *trī-dăk'tĭ-lŭs* [Gr. *treis*, three; *daktŭlos*, a finger or toe]: having three fingers or toes.

TRIDENT, n. *trī'dĕnt* [F. *trident*, a trident—from L. *tridens* or *triden'tem*, having three teeth—from *tres*, three; *dens* or *dentem*, a tooth: It. *tridente*]: any instr. in the form of a fork with three prongs; a kind of sceptre or spear having three prongs; the sceptre of Neptune, the fabulous god of the sea; a figure frequent on ancient coins. TRI'DENTED, a. in *OE.*, having three teeth or prongs. TRIDENTATE, a. *trī-dĕn'tāt*, in *bot.*, having three teeth, or tooth-like divisions.

TRIDENTINE, a. *trī-dĕn'tĭn* [L. *Triden'tum*, Trent]: pertaining to the celebrated Council of Trent, or to Trent —e.g., the 'Tridentine Profession': see TRENT, COUNCIL OF.

TRIDIMENSIONAL, a. *trī-dĭ-mĕn'shŭn-ăl* [L. *tres*, three; and Eng. *dimension*]: having three dimensions; having length, breadth, and thickness.

TRIDING, n. *trī'dĭng* [see RIDING]: in *OE.*, the third part of a county or shire—now retained in Yorkshire in the corrupt form *Riding* (q.v.).

TRIDUO, n. *trĭd'ū-ō* [It.—from L. *triduum*]: in the *Rom. Cath. Chh.*, prayers through three days, followed by Benediction, as preparation for keeping a saint's day, or a means of obtaining some favor from God through intercession of one of his saints. TRIDUUM, n. *trĭd'ū-ŭm*, last three days of Lent; any three days kept in a special manner, as during a retreat, or as a preparation for a feast.

TRIDYMITE, n. *trī'dĭ-mīt* [Gr. *tridŭmos*, triple]: a mineral similar to quartz, occurring in triple plates.

TRIED, pp.: see under TRY.

TRIENNIAL, a. *trī-ĕn'nĭ-ăl* [L. *trienniŭm*, the space of three years—from *tres*, three; *annus*, a year]: continuing three years, as *triennial* parliaments; happening every three years. TRIEN'NIALLY, ad. *-lĭ*. TRIENNIAL ACT, in *Eng. hist.*, an act of William and Mary, 1695, providing that no parliament should last longer than three years, repealed 1717.

TRIENS, n. *trī'ĕnz* [L. the third part of an as, a third part]: in *law*, a third part; dower.

TRIER, n. *trī'ėr* [from TRY (which see)]: one who examines anything by a test or standard.

TRIESTE, *trē-ĕst'* (Ger. *Triest*, Slav. *Térst*): city, the most important seaport of the Austro-Hungarian empire, and the most considerable trading-town on the Adriatic; stands at the head of the Gulf of Trieste, an arm of the Gulf of Venice; 90 miles s.w. of Laibach, on the Vienna and Trieste railway. It was an imperial free town; and attached and belonging to it is a territory of 46 sq.m., consisting of the slopes of the *Triestiner Karst*, which decline somewhat abruptly toward the Adriatic shore. The city of Trieste, in which the population of the district is almost wholly massed, the other places being only small villages, consists of the old town, the new town, or Theresienstadt, and the two suburbs, Josefstadt and Franzenstadt. The old town, on the slope of a steep hill, surmounted by a castle (built 1680), forms about a fourth of the whole city, and is distinguished by its narrow streets and black walls. It contains the cathedral, an early Byzantine edifice of uncertain date, into whose walls stones bearing Roman inscriptions and carving have been built, and whose tower is said to rest on the foundation of a temple of Jupiter. The new town, with broad streets in regular parallelograms and with handsome houses, occupies the plain fronting the sea. Between these two divisions runs the *Corso*, chief thoroughfare of the city. The *Tergesteum*, in the new town, is a splendid modern edifice, containing a bazaar, a grand concert and ball room, exchange and reading rooms, and the offices of the Austrian Lloyd's, the largest establishment in Europe for sea-steamers. North, on the seashore, is the new and magnificent Lazaretto, with a harbor in which 60 vessels can perform quarantine at once. There are numerous churches for Greeks, Jews, Roman Catholics, and Protestants. The population includes Germans, Americans, Italians, Greeks, Jews, Armenians, Dalmatians, etc.; but Italian is the prevailing language. Trieste was, till 1882, a free port; the harbor, with entrance uninterrupted by islands or sandbanks, is well protected. The manufactures are very extensive. There are many establishments for ship-building, and several soap-works and rope-works. Rosoglio, white-lead, and leather are manufactured, and wax-bleaching is carried on. The annual value of exports and imports is about $150,000,000. An addition to the harbor was opened 1883.—Pop. (1880) 133,019—dist. 144,844; (1890) city 158,344—dist. 157,466; (1900) 178,127.

Trieste, ancient *Tergeste* or *Tergestum*, was important under the Romans, and appears in history first B.C. 51, when it was overrun and plundered by neighboring tribes. It was much improved by Augustus, and 1382 passed finally into the hands of Austria. It owes its

prosperity chiefly to Emperor Charles VI., who constituted it a free port, and to Maria Theresa. Since 1816 Trieste has borne the title 'The Most Loyal of Towns.' It ceased to be a free town 1891.

TRIFACIAL, a. *trī-fā'shal* [L. *tres,* three; *făcĭēs,* the face]: of or pertaining to the trigeminal or fifth cranial nerve, the great sensitive nerve of the head and face.

TRIFARIOUS, a. *trī'fā'rĭ-ŭs* [L. *trifarĭus,* of three sorts or ways]: in *bot.,* in three rows; looking in three directions.

TRIFID, a. *trī'fĭd* [L. *trifĭdus,* cleft into three parts —from *tres,* three; *fidi,* I have cleft; *findo,* I cleave]: in *bot.,* three-cleft; divided, as a leaf, into three segments which reach to the middle.

TRIFLE, n. *trī'fl* [OF. *trufle, truffle,* mockery, raillery from *truffe,* a mock, a jest, a truffle (see TRUFFLE): It. *truffa,* a toy, an idle thing]: thing of little value or importance; small light cake or confection flavored, and soaked in wine or brandy, with syllabub poured over it: V. to act or talk lightly; to indulge in light or silly amusements; to spend or waste unprofitably; in *OE.,* to play with; to reduce to a trifle; make trivial. TRI'FLING, imp. *-flĭng:* ADJ. treating serious things with lightness; of small importance or value; nugatory: N. employment about things of no importance; the treating of serious things with lightness. TRIFLED, pp. *trī'fld.* TRI'FLER, n. *-flėr,* one who wastes time idling, or who acts with levity. TRI'FLINGLY, ad. *-flĭng-lĭ.* TRI'FLINGNESS, n. *-nĕs,* the state of being trifling. TO TRIFLE WITH, to befool; to delude; to treat as of no estimation.

TRIFOLIATE, a. *trī-fō'lĭ-āt,* or TRIFO'LIOLATE, a. *-lĭ-ō-lāt* [L. *tres,* three; *folĭum,* a leaf]: in *bot.,* having three leaves or leaflets from the same point. TRIFO'LIUM, n. *-lĭ-ŭm,* a genus of papilionaceous plants, commonly known as clovers or trefolis; common red clover is *Trifolĭum praten'sĕ*—the white Dutch clover, the shamrock of Ireland, is *T. repens,* ord. *Legumĭnōsæ* (see TREFOIL: CLOVER).

TRIFORIUM, n. *trī-fō-rĭ-ŭm* [L. *tres,* three; *foris,* a door]: in *arch.,* the open gallery or arcade in the wall above the arches of the nave of a cathedral or church. It is between the central and side aisles, and is usually a dark gallery, being the wall-space against which the lean-to roof of the aisles rests. In the later styles the side-aisles are covered with independent roofs, allowing the triforium arches to be filled with glass.

TRIFORM, a. *trī'fawrm* [L. *tres,* three; *forma,* a shape]: having a triple form or shape.

TRIFURCATE, a. *trī-fėr'kāt,* or TRIFUR'CATED, a. *-kā-tĕd* [L. *tres,* three; *furca,* a fork]: having three branches or forks.

TRIG, a. *trĭg* [from *trick,* to dress, to decorate; W. *trec,* harness, gear]: true; tight; firm; trim; neat: V. to

trick out. TRIG'GING, imp. TRIGGED, pp. *trĭgd.* TRIG'NESS, n. *-nĕs,* smartness; neatness.

TRIG, n. *trĭg* [Dut. *trekken,* to pull, the root of *trigger*]: a wedge to prop a cask, or to stop a wheel: V. to skid a wheel.

TRIGAMOUS, a. *trĭg'ă-mŭs* [Gr. *treis,* three; *gamos,* marriage]: thrice married; pertaining to or characterized by trigamy: in *bot.,* having three sorts of flowers in the same flower-head, i.e., male, female, and hermaphrodite. TRIG'AMY, n. *-mĭ,* the state of having married three times; state of having three wives or three husbands living at the same time. TRIG'AMIST, n. *-mĭst,* one who has been thrice married.

TRIGEMINAL, a. *trī-jĕm'ĭ-năl* [L. *tres,* three; *gemĭnus,* double]: in *anat.,* pertaining to the fifth pair of cranial nerves, which have three main branches.

TRIGGER, n. *trĭg'gėr,* in *OE.* TRICKER, n. *trĭk'kėr* [Dut. *trekker,* a trigger; *trekken,* to pull: Sw. *trycka,* to press]: the catch in a firearm which, when pulled, sets free the lock or clap for striking fire (see LOCK); a catch to hold the wheel of a carriage on a declivity; a wedge placed under the foot of the dog-shore, and withdrawn at the moment of launching a ship.

TRIGGER-FISH: one of the fishes of the plectognath family *Balistidæ,* in which when the dorsal fin is erected, the first ray, which is very thick and strong, holds its elevated position so firmly that it cannot be pressed down; but if the second ray be depressed, the first immediately falls down like the hammer of a gun when the trigger is pulled. The 8 or 10 genera and about 100 species are all inhabitants of warm seas. A single species (*B. carolinensis*) of the typical genus *Balistes* occasionally wanders northward on the Atlantic coast as far as Cape Cod. It is a rather handsome fish with the body enclosed in a heavy armor of scales, and has three stout dorsal spines. The fool-fishes or file-fishes, so called on account of their large, expressionless, staring eyes and rough prickly skins, are closely related. In West Indian waters are many representatives of these and other genera, and especially of Balistes.

TRIG'LA. See GURNARD.

TRIGLYPH, n. *trī'glĭf* [Gr. *treis,* three; *gluphē,* a carving]: in *arch.,* an ornament consisting of a grooved tablet in the frieze of the Doric (q.v.) order, repeated at equal intervals; it is supposed to represent the ends of the beams in the original wooden temples. It is always divided into channels or flutes, with guttæ or drops below. TRIGLYPHIC, a. *trī-glĭf'ĭk,* or TRIGLYPHICAL, a. *-ĭ-kăl,* pertaining to triglyphs; containing three sets of sculptures.

TRIGON, n. *trī'gŏn* or *trĭg'ŏn* [Gr. *treis,* three; *gōnĭa,* an angle]: a triangle: in *astrol.,* the junction of three signs of the zodiac. TRIG'ONAL, a. *-ō-năl,* or TRIG'ONOUS,

a. *-nŭs,* triangular; having three angles or corners: in *bot.,* having three angles, the faces being convex. TRIG'-ONOLLY, ad. *-lĭ.*

TRIGONIA, *trī-gō-nĭ-a:* genus of mollusca, represented at the present day by only three species, natives of Australia, but remarkably abundant as fossils. More than 100 species have been described from strata between the Devonian and the Chalk inclusive, but not a single species is known from any Tertiary deposit. The shell is trigonal (whence the name), thick, and tuberculated, or ornamented with radiating or concentric ribs. The interior is nacreous. The external ligament is small and prominent, and the huge teeth are large, diverging, and transversely striated. The animal has a long, pointed, and powerful foot, with which it makes long leaps.

TRIGONOCARPUS, *trĭg-ō-nō-kâr'pŭs:* common fossil fruit in the Coal-measures, occurring in all the strata except the underclays and limestones. Six or eight species have been established, differing in size and shape—some as small as a pea, others as large as a walnut. They are marked, when preserved in the round, with three longitudinal ridges, and from this character the name was derived. They have never been found attached to any plant. Dr. Hooker, from examination of several specimens which exhibit structure, has shown that they are not unlike the structure of *Salisburia,* drupe-bearing coniferous tree, native of China and Japan, cultivated in Europe and America for its beauty, its singular leaves resembling those of a maiden-hair fern enlarged. The determination of the affinities of this fruit is important, as the existence of conifers in the Coal-measures was known from the occurrence in them of disk-bearing woody tissue; and the absence of linear leaves and cones makes it more probable that they belonged to the drupe-bearing division of the order. It is probable that the trunk, to which the generic name *Dadoxylon* has been given, and the cast of whose large pith is known as *Sternbergia,* had for its leaves the fern-like fossils named *Noggerathia flabellata,* and *Trigonocarpus* for its fruit. Dr. Dawson has, however, recently referred some *Trigonocarpa* to *Sigillaria,* and he considers the anomalous organism called *Antholites* to be the bud-form of the fruit. He has never found them in contact with *Sigillaria,* and it is much more probable that this was a cryptogamous tree, and consequently had spores, and not seeds, for its fruit.

TRIGONOCEPHALUS, *trĭg-ō-nō-sĕf'ā-lŭs:* genus of extremely venomous serpents, of family *Crotalidæ,* nearly allied to rattlesnakes, but having the tail terminated with a spine instead of a rattle. The head is covered with plates or shields; the dorsal scales are keeled. *T. rhodostoma* may be mentioned as an example. It is found in Java, and preys chiefly on frogs. *Cenchris, Craspedocephalus,* and other genera have recently been separated from trigonocephalus. The Mocassin Snake of the s.

United States belongs to the genus *Agkistrodon*. One of the most dangerous serpents of the W. Indies is *Craspedocephalus lanceolatus*, called Fer-de-lance, which infests sugar-plantations and is a terror to man and beast.

TRIGONOMETRY, [Gr. τρῖγωνον, a triangle, and μετρον, a measure]: that branch of mathematics which is primarily concerned with the solution of triangles, and the calculation of angles, lines and areas associated with figures, both in the plane and on the surface of a sphere. It is accordingly divided into two branches, *Plane Trigonometry* and *Spherical Trigonometry*. Elementary trigonometry has many practical applications. A knowledge of its elements is indispensable in the study of navigation, astronomy, every branch of engineering, and the physical sciences. While its primary concepts are based upon a knowledge of elementary geometry, its purpose and method are essentially different from those of geometry. If, for example, the *magnitudes* of three parts of a triangle are given, at least one part being a side, we can by geometry construct the triangle, and thus obtain the *magnitudes* of the three unknown parts. If, however, the *numerical values* of any three parts of a triangle, of which at least one is a side, are given, we can by trigonometry calculate the *numerical values* of the other three parts. Such an operation is called *the solution of the triangle*. Thus trigonometry is seen to be concerned with numbers, while geometry has comparatively little to do with numbers or computation. Or, in other words, the processes of trigonometry are algebraical and arithmetical.

Plane Trigonometry.—In the computations of trigonometry we make use of certain *abstract numbers*, which are called the *Trigonometrical Functions* of an angle. The names of these functions are *sine, cosine, tangent, cotangent, secant*, and *cosecant*. The abbreviated forms of these names are, respectively, *sin, cos, tan, cot, sec*, and *csc*. These six numbers are the *six ratios* of the three sides of a right triangle, and are defined as follows:

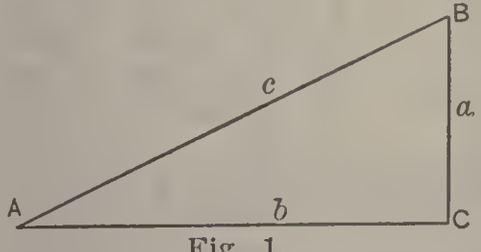


Fig. 1.

Let ABC be any right triangle, the right angle being at C. Let A, B, C, denote the angles, and a, b, c, represent the sides lying opposite to them respectively. Then

$$\sin A = \frac{a}{c} = \cos B, \quad \cos A = \frac{b}{c} = \sin B,$$

$$\tan A = \frac{a}{b} = \cot B, \quad \cot A = \frac{b}{a} = \tan B,$$

$$\sec A = \frac{c}{b} = \csc B, \quad \csc A = \frac{c}{a} = \sec B.$$

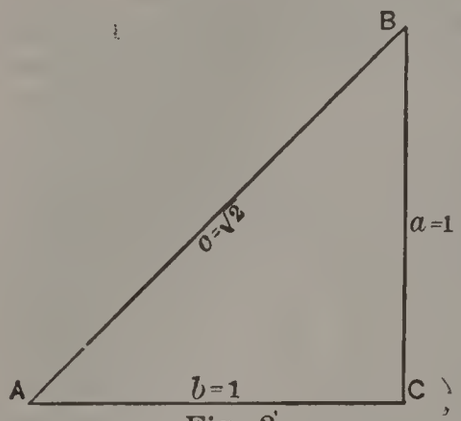


Fig. 2.

From the properties of similar triangles it follows that if we merely change the size of the triangle without changing the angles, these ratios will not be altered. But if we change the angles A and B, these ratios will be changed. For this reason these ratios are said to be *functions of the angles A and B.*

The functions of a few angles can easily be found by geometry. For example, in the triangle ABC let $A = B = 45°$, and let $a = 1$. Then $b = 1$ and $c = \sqrt{2}$.

Therefore $\sin 45° = \cos 45° = \frac{1}{\sqrt{2}}$, $\tan 45° = \cot 45° = 1$, and $\sec 45° = \csc 45° = \sqrt{2}$.

Again, let $A = 30°$ and $B = 60°$. Take side $a = 1$. Then we know by geometry that $c = 2$ and $b = \sqrt{3}$.

Hence

$$\sin 30° = \tfrac{1}{2} = \cos 60°, \quad \cos 30° = \frac{\sqrt{3}}{2} = \sin 60°,$$

$$\tan 30° = \frac{1}{\sqrt{3}} = \cot 60°, \quad \cot 30° = \sqrt{3} = \tan 60°,$$

$$\sec 30° = \frac{2}{\sqrt{3}} = \csc 60°, \quad \csc 30° = 2 = \sec 60°.$$

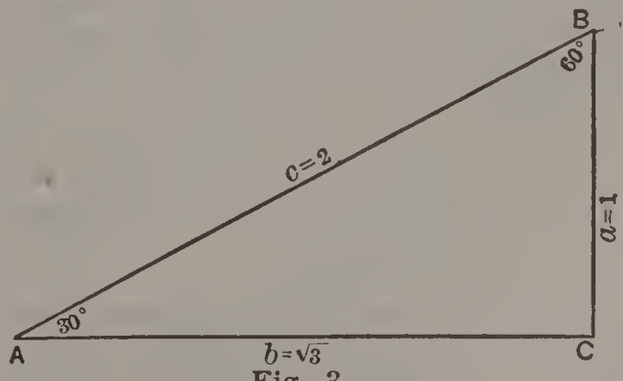


Fig. 3.

A table which gives the values of the functions of all angles from 0° to 90° at equal intervals, say at intervals of 1°, or 10′, or 1′, is called a table of *Natural Trigonometric Functions.* A table which gives the logarithms of the natural functions is called a table of *Logarithmic Functions.*

Solution of Right Triangles.—A right triangle consists of five parts, excluding the right angle. If any two of these parts are given, one of which is a side, the remaining parts may be computed by means of the following formulas:

$$a = \sqrt{c^2 - b^2} = c \sin A = c \cos B = b \tan A = b \cot B.$$

$$b = \sqrt{c^2 - a^2} = c \sin B = c \cos A = a \tan B = a \cot A.$$

$$c = \sqrt{a^2 + b^2} = \frac{a}{\sin A} = \frac{a}{\cos B} = \frac{b}{\cos A} = \frac{b}{\sin B}.$$

$$A = \sin^{-1}\frac{a}{c} = \cos^{-1}\frac{b}{c} = \tan^{-1}\frac{a}{b}.$$

$$B = \sin^{-1}\frac{b}{c} = \cos^{-1}\frac{a}{c} = \tan^{-1}\frac{b}{a}.$$

The symbols $\sin^{-1}$, $\cos^{-1}$, etc., are read, *The angle whose sine is, The angle whose cosine is,* etc. In applying these formulas it is, of course, necessary to have a table either of natural or logarithmic functions.

General Definitions of the Trigonometric Functions.— The definitions of the trigonometric functions given above apply only to positive acute angles. We will now define them for both posiotive and negative angles of any magnitude.

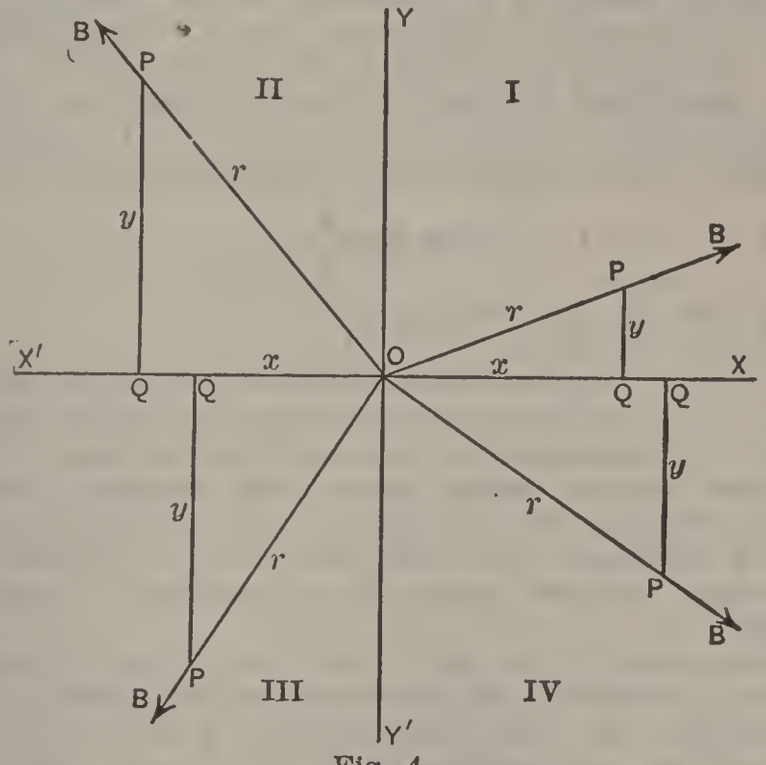


Fig. 4.

Let X'X (called the x-axis) and Y'Y (the y-axis) be two fixed perpendicular lines intersecting in *O*. These lines divide the plane, and the perigon around *O*, into four equal parts called quadrants, which are numbered I, II, III, IV, in the order indicated in the figure.

Imagine a straight line with one end at *O* to start from the position *OX* and to revolve about *O* until it comes to the position *OB*. This line is then said to have described the angle *XOB*. The line *OX*, in the position from which the revolving line starts, is called the *Initial Line*, and *OB* the *Terminal Line* of the angle. If the line revolves in the same direction as the hands of a clock, the angle is considered *negative;* if in the opposite direction, *positive*. If the terminal line lies any-

where in the first quadrant, i.e., anywhere between OX and OY, no matter how many times it may have swept over this entire quadrant in its revolution about O, or in which direction it may revolve to reach its final position, the angle XOB is said to *fall in the first quadrant*, or to be *an angle of the first quadrant*. Similarly for the other quadrants. It is now evident that, under this conception of an angle, there may be an indefinite number of angles, both positive and negative, which have the same initial line and the same terminal line. Such angles are said to be *congruent*. It is also easy to see that congruent angles must differ by some positive or negative multiple of four right angles.

Let the terminal line OB have any one of the positions shown in the figure. Take any point P on the terminal line, and draw PQ perpendicular to OX, thus forming the right triangles OPQ. We will call these triangles the *Triangles of Reference* for the angles of the different quadrants, respectively. Now let OQ be denoted by x, QP by y, and OP by r. Let A denote the angle XOP, that is, let A be any angle of any quadrant, of any magnitude, either positive or negative. Then the general definitions of the trigonometric functions are as follows:

$$\sin A = \frac{y}{r}, \quad \cos A = \frac{x}{r}, \quad \tan A = \frac{y}{x}$$

$$\csc A = \frac{r}{y}, \quad \sec A = \frac{r}{x}, \quad \cot A = \frac{x}{y}.$$

That is, the trigonometric functions of an angle are *the ratios of the sides of the triangle of reference of that angle*. It is worthy of notice here that the values of the functions as here defined depend only upon the *position* of the terminal line, and not on the magnitude or the sign of the angle; or in other words, the respective functions have the same value for any number of congruent angles.

The algebraic signs of the functions are determined as follows: OQ, or x, is considered positive when Q falls to the right of O, and negative when Q falls to the left of O; QP, or y, is positive when P lies above Q, and negative when P falls below Q. OP is always taken along the positive direction of the terminal line, so that r is always positive. Hence the signs of the functions depend upon the signs of x and y. The following table shows the signs of the functions of an angle in each quadrant:

	I	II	III	IV
sin and csc	+	+	—	—
cos and sec	+	—	—	+
tan and cot	+	—	+	—

Trigonometric Formulas.—From the general definitions of the functions we can easily deduce the following identical relations:

$$\sin A \csc A \equiv 1, \quad \cos A \sec A \equiv 1, \quad \tan A \cot A \equiv 1,$$

$$\tan A \equiv \frac{\sin A}{\cos A}, \quad \cot A \equiv \frac{\cos A}{\sin A}$$

Furthermore, since x, y, and r are always the sides of a right triangle, we know that $x^2 + y^2 = r^2$. If we divide this equation by r^2, x^2, y^2 in turn, and express the resulting ratios in terms of the functions, we will get, respectively

$\sin^2 A + \cos^2 A \equiv 1$, $1 + \tan^2 A \equiv \sec^2 A$, $1 + \cot^2 A \equiv \csc^2 A$.

By means of these eight identities the value of any one of the functions can be expressed in terms of each of the other functions. That is to say, the trigonometric functions of an angle are not independent, but are so related that if any *one* is known, all the others can be found.

If we let x, y, r, be the sides of the triangle of reference for any angle A, and x', y', r', the sides of the triangle of reference for the angle $(90° + A)$, it can easily be shown on drawing the figure, that, whatever angle A may be, if we take $r' = r$, then will $x' = -y$, and $y' = x$. Therefore

$$\sin (90° + A) = \frac{y'}{r'} = \frac{x}{r} = \cos A, \text{ and}$$

$$\cos (90° + A) = \frac{x'}{r'} = -\frac{y}{r} = -\sin A.$$

In like manner it can be shown that

$\sin (90° - A) = \cos A$, $\cos (90° - A) = \sin A$,

$\sin (180° \pm A) = \mp \sin A$, $\cos (180° \pm A) = -\cos A$,

$\sin (270° \pm A) = -\cos A$, $\cos (270° \pm A) = \pm \sin A$,

$\sin - A = -\sin A$, $\cos - A = \cos A$.

It is necessary to observe here that when two of the double signs occur in the same formula, the upper signs must be taken together, and the lower signs must be taken together. From these equations (or directly from the triangles of reference) it is easy to deduce similar ones connecting the other functions, hence it is possible by means of these formulas to express the functions of an angle of any quadrant in terms of the functions of a positive angle less than 90°. The significance of this fact is that a table giving the values of the functions of all angles from 0° to 90° is sufficient for all practical purposes.

Among all the formulas of trigonometry the so-called *Addition Formulas* stand foremost in importance. These are the formulas which give the functions of the sum, or the difference of two angles in terms of the functions of the separate angle. The most important ones are:

$$\sin (A \pm B) = \sin A \cos B \pm \cos A \sin B,$$

$$\cos (A \pm B) = \cos A \cos B \mp \sin A \sin B,$$

$$\tan (A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}.$$

If we let B become equal to A in these equations, and use the upper signs, we get

$$\sin 2A = 2 \sin A \cos A,$$

$$\cos 2A = \cos^2 A - \sin^2 A = 2\cos^2 A - 1 = 1 - 2\sin^2 A,$$

$$\tan 2A = \frac{2\tan A}{1 - \tan^2 A}.$$

In the formulas for $\cos 2A$ write $\frac{1}{2}A$ in the place of A. This will give

$$\sin \tfrac{1}{2}A = \sqrt{\tfrac{1}{2}(1 - \cos A)} \text{ and } \cos \tfrac{1}{2}A = \sqrt{\tfrac{1}{2}(1 + \cos A)}.$$

Whence $$\tan \tfrac{1}{2}A = \sqrt{\frac{1 - \cos A}{1 + \cos A}}.$$

By adding and subtracting the addition formulas, we get

$$\sin (A + B) + \sin (A - B) = 2\sin A \cos B,$$
$$\sin (A + B) - \sin (A - B) = 2\cos A \sin B,$$
$$\cos (A + B) + \cos (A - B) = 2\cos A \cos B,$$
$$\cos (A + B) - \cos (A - B) = -2\sin A \sin B.$$

Now let $P = A + B$, and $Q = A - B$, then we have

$$\sin P + \sin Q = 2\sin \tfrac{1}{2}(P + Q) \cos \tfrac{1}{2}(P - Q),$$
$$\sin P - \sin Q = 2\cos \tfrac{1}{2}(P + Q) \sin \tfrac{1}{2}(P - Q),$$
$$\cos P + \cos Q = 2\cos \tfrac{1}{2}(P + Q) \cos \tfrac{1}{2}(P - Q),$$
$$\cos P - \cos Q = -2\sin \tfrac{1}{2}(P + Q) \sin \tfrac{1}{2}(P - Q).$$

These are usually called the *Conversion Formulas.*

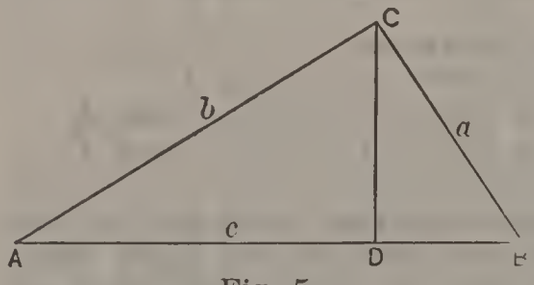


Fig. 5.

Solution of Oblique Triangles.—The formulas necessary for the complete solution of the oblique triangle can now be easily developed. Let A, B, C, denote the angles of the triangle ABC, and a, b, c, the sides opposite to them, respectively. From the vertex C draw CD perpendicular to AB. Then

$$CD = b \sin A = a \sin B. \quad \text{Whence } \frac{a}{\sin A} = \frac{b}{\sin B}$$

In like manner by dropping a perpendicular from B on AC, or from A on BC, we can prove

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

The theorem expressed by this equation is known as the *Law of the Sines;* i.e., *In any plane triangle the sides are proportional to the sines of the opposite angles.* This formula can be used in the solution of a triangle when *two angles and a side,* or when *two sides and an angle opposite to one of them,* are known.

From the law of sines by composition and division

$$\frac{a + b}{a - b} = \frac{\sin A + \sin B}{\sin A - \sin B}.$$

Applying the conversion formulas to the second member of this equation gives

$$\frac{a+b}{a-b}=\frac{\tan\frac{1}{2}(A+B)}{\tan\frac{1}{2}(A-B)},$$

which is known as the *Law of the Tangents.* When *two sides and the included angle* are known this formula can be used to find the other two angles. Then the third side can be found by the law of sines.

In the above triangle we know from a familiar theorem of geometry that

$$BC^2=AC^2+AB^2-2AB\cdot AD.$$

But $AD=b\cos A$. Hence by substitution we have

$$a^2=b^2+c^2-2bc\cos A,$$

which is the so-called *Law of Cosines.*

Substituting the value of $\cos A$ given by this last equation in the formulas for $\sin\frac{1}{2}A$ and $\cos\frac{1}{2}A$, and letting $s=\frac{1}{2}(a+b+c)$ gives

$$\sin\tfrac{1}{2}A=\sqrt{\frac{(s-b)(s-c)}{bc}} \text{ and } \cos\tfrac{1}{2}A=\sqrt{\frac{s(s-a)}{bc}}$$

Whence $$\tan\tfrac{1}{2}A=\sqrt{\frac{(s-b)(s-c)}{s(s-a)}}=$$

$$\frac{1}{s-a}\sqrt{\frac{(s-a)(s-b)(s-c)}{s}}=\frac{r}{s-a}$$

where $$r\equiv\sqrt{\frac{(s-a)(s-b)(s-c)}{s}}.$$

By merely changing the letters we get similar formulas for angles B and C, so that we have finally

$$\tan\tfrac{1}{2}A=\frac{r}{s-a},\ \tan\tfrac{1}{2}B=\frac{r}{s-b},\ \tan\tfrac{1}{2}C=\frac{r}{s-c},$$

which are the best formulas for computing the angles of a triangle when the *three sides are given.*

The angles can also be found in this case by the law of cosines; but, since this formula is not adapted to the use of logarithms, it is not desirable to use it unless the given sides are small integers.

If we let K represent the area of the triangle, then

$$K=\tfrac{1}{2}bc\sin A=\tfrac{1}{2}a^2\frac{\sin B\sin C}{\sin(B+C)}$$

Spherical Trigonometry.—The object of spherical trigonometry is to show how to compute any three parts of a spherical triangle when the other three parts are given. The sides of the spherical triangles here considered are assumed to be arcs of great circles, each side being less than 180°. We shall use the same notation as in the plane triangle.

Solution of Right Spherical Triangles.—When we have given *any two* parts besides the right angle of a right-spherical triangle, the triangle can be solved by a very simple rule called *Napier's Rule of the Circular Parts,*

because it was devised by Lord Napier, the inventor of logarithms. For this purpose (leaving out of account the right angle), the sides a and b, the complements of the oblique angles A and B, and the complement of the hypotenuse c, are called the five *Circular Parts.* Any one of these parts may be taken as a *middle part;* then the two parts immediately adjacent are called *adjacent parts,* and the other two are called *opposite parts.* Napier's rule may then be stated as follows:

The sine of the middle part is equal to the product of the tangents of the adjacent parts, or to the product of the cosines of the opposite parts.

Taking each of the five circular parts as the middle part, Napier's rule gives the following ten formulas:

$$\begin{aligned}
\sin a &= \sin c \sin A = \tan b \cot B,\\
\sin b &= \sin c \sin B = \tan a \cot A,\\
\cos c &= \cos a \cos b = \cot a \cot B,\\
\cos A &= \cos a \sin B = \cot c \tan b,\\
\cos B &= \cos b \sin A = \cot c \tan a.
\end{aligned}$$

If one side of a spherical triangle is 90°, its polar will be a right triangle. Hence the solution of a quadrantal triangle may be obtained by solving its polar by Napier's rule.

Solution of Oblique Spherical Triangles.—We also have the following formulas for the solution of oblique spherical triangles:

Law of sines, $\dfrac{\sin a}{\sin A} = \dfrac{\sin b}{\sin B} = \dfrac{\sin c}{\sin C}$.

Law of cosines,

$$\cos a = \cos b \cos c + \sin b \sin c \cos A,$$

and $$\cos A = -\cos B \cos C + \sin B \sin C \cos a.$$

If the three sides are given, the angles may be found by

$$\tan \tfrac{1}{2} A = \frac{\tan r}{\sin (s-a)}, \quad \tan \tfrac{1}{2} B = \frac{\tan r}{\sin (s-b)},$$

$$\tan \tfrac{1}{2} C = \frac{\tan r}{\sin (s-c)},$$

where $$\tan r = \sqrt{\frac{\sin (s-a) \sin (s-b) \sin (s-c)}{\sin s}}$$

We also have $$\sin \tfrac{1}{2} A = \sqrt{\frac{\sin (s-b) \sin (s-c)}{\sin b \sin c}}$$

and $$\cos \tfrac{1}{2} A = \sqrt{\frac{\sin s \sin (s-a)}{\sin b \sin c}},$$ with similar formulas for the other two angles.

If the three angles are known, the sides may be computed by

$$\tan \tfrac{1}{2} a = \tan R \cos (S-A), \quad \tan \tfrac{1}{2} b = \tan R \cos (S-B),$$

and $$\tan \tfrac{1}{2} c = \tan R \cos (S-C),$$

where $\tan R = \sqrt{\dfrac{-\cos S}{\cos (S-A)\cos (S-b)\cos (S-C)}}$,

and $S = \frac{1}{2}(A+B+C)$.

Or, we may use $\sin \frac{1}{2} a = \sqrt{\dfrac{-\cos S \cos (S-A)}{\sin B \sin C}}$,

or $\cos \frac{1}{2} a = \sqrt{\dfrac{\cos (S-B)\cos (S-C)}{\sin B \sin C}}$, with similar formulas for the other two sides.

We also have the four equations,

$$\cos \tfrac{1}{2}(A+B)\cos \tfrac{1}{2} c = \cos \tfrac{1}{2}(a+b)\sin \tfrac{1}{2} C,$$
$$\sin \tfrac{1}{2}(A+B)\cos \tfrac{1}{2} c = \cos \tfrac{1}{2}(a-b)\cos \tfrac{1}{2} C,$$
$$\cos \tfrac{1}{2}(A-B)\sin \tfrac{1}{2} c = \sin \tfrac{1}{2}(a+b)\sin \tfrac{1}{2} C,$$
$$\sin \tfrac{1}{2}(A-B)\sin \tfrac{1}{2} c = \sin \tfrac{1}{2}(a-b)\cos \tfrac{1}{2} C,$$

which are called *Gauss's Equations.*

From these we easily get

$$\tan \tfrac{1}{2}(A+B) = \frac{\cos \frac{1}{2}(a-b)}{\cos \frac{1}{2}(a+b)} \cot \tfrac{1}{2} C,$$

$$\tan \tfrac{1}{2}(A-B) = \frac{\sin \frac{1}{2}(a-b)}{\sin \frac{1}{2}(a+b)} \cot \tfrac{1}{2} C,$$

$$\tan \tfrac{1}{2}(a+b) = \frac{\cos \frac{1}{2}(A-B)}{\cos \frac{1}{2}(A+B)} \tan \tfrac{1}{2} c,$$

$$\tan \tfrac{1}{2}(a-b) = \frac{\sin \frac{1}{2}(A-B)}{\sin \frac{1}{2}(A+B)} \tan \tfrac{1}{2} c.$$

These equations are known as *Napier's Analogies.*

If two sides and the included angle, or one side and the two adjacent angles, are given, the remaining parts may be computed by means of Napier's analogies and Gauss's equations. If two sides and an angle opposite to one of them are given, the angle opposite the other given side may be found by the law of sines. Likewise, if two angles and a side opposite to one of them are given, the side opposite the other given angle may be found by the law of sines. In both these cases the remaining parts may be found by Napier's analogies. In these last two cases there *may be two* solutions.

It is worthy of notice that many of these formulas are closely analogous to the corresponding formulas for plane triangles.

TRIGRAPH, n. *trī'grăf* [Gr. *treis,* three; *graphō,* I write]: a combination of three letters to express one sound; a triphthong.

TRIGYN, n. *trī'jĭn* [Gr. *treis,* three; *gunē,* a woman]: in *bot.,* a plant having three styles.

TRIHEDRON, n. *trī hē'drŏn* [Gr. *treis,* three; *hedra,* a seat, a base]: a figure having three equal sides. TRIHE'DRAL, a. *-drăl,* having three equal sides.

TRIJUGATE, *trī'jû-gāt*, or Tri'jugous, a. *-gŭs* [L. *tres*, three; *jugum*, yoke]: in *bot.*, having three pairs of leaflets.

TRIKHALA, or Trikala, *trē'kâ-lâ:* town of the kingdom of Greece, 33 m. w.s.w. of Larissa; on the slope of a hill. It manufactures cotton and woolen stuffs and has large transit-trade. The neighboring plains, watered by the Salambria (ancient *Peneus*), are rich in all sorts of fruits.—Trikhala is the *Trikka* of Homer, and was celebrated for its temple of Æsculapius. Trikhala was ceded to Greece, with s. Thessaly, 1881.—Pop. (1901) 25,000.

TRIKOUPIS, Charilaos: Greek statesman, son of Spiridion Trikoupis (q.v.): b. Nauplia 1832, July 23; d. Cannes, France, 1896, Apr. 11. He inherited his father's literary bent of mind and later began the study of jurisprudence in Athens, afterward studying and completing his course at Paris. His mind then turned toward diplomacy and in 1852 he entered the service of his country as attaché to the legation in London, and in 1863 was promoted *chargé d'affaires.* In 1865 he was in charge of the negotiations with England which brought about the cession of the Ionian Islands. He was elected to the Boulé the latter part of the same year, and joining the Radical party became successively minister of foreign affairs in 1866, premier in 1875, and again in 1877 minister of foreign affairs in the coalition ministry under Canaris. He then again became premier in 1878-80, and served also the terms 1882-5, 1886-90, 1891-3, and 1893-5, but at the next election he was defeated and even lost his seat in the Boulé. This was probably due to the low state of the finances of the government, which he had in vain attemptel to raise to a degree of stability through the imposition of tariffs and the enactment of agrarian laws as well as by the building of railways. Public confidence in his administrative ability was, however, once more shown by his re-election from the district of Valtos, but he was at the time sick and died before taking his seat. His speeches, Λόγοι πολιτικοί, were published in one volume at Athens in 1888.

TRIKOUPIS, Spiridion: Greek statesman and man of letters: b. Missolonghi, 1788, Apr. 20; d. Athens 1873, Feb. 24. After completing his education at Paris and London he became private secretary to Lord Guilford at Corfu. In 1821, upon the outbreak of the Greek insurrection, he returned to Missolonghi and joined the patriots. Throughout much of his life he was engaged either in administrative or diplomatic affairs. From 1833-41 he was minister to England, and after 1843 he held in succession the portfolios of the ministry of foreign affairs and of public instruction, the vice-presidency of the Senate, and the post of envoy extraordinary to

France. As a man of letters he was among the greatest names of modern Greece. Most celebrated of his works was the oration pronounced on Lord Byron, his friend and associate, at the cathedral of Missolonghi. His *Poeme des Kliphtes* (1820) is well known, as is also his *Histoire de la révolution greeque* (1853-7).

TRILAMELLAR, a. *trī-lăm'ĕl-lėr* [L. *tres,* three; *lamella,* a small plate of metal]: in *bot.,* three-layered: applied to a compound stigma having three divisions flattened like bands.

TRILAMINAR, a. *trī-lăm'ĭ-nėr* [L. *tres,* three; *lamĭna,* a plate, a leaf]: consisting of threefold laminæ or layers of cells, as the blastoderm.

TRILATERAL, a. *trī-lăt'ėr-ăl* [L. *tres,* three; *latus,* a side, *latĕris,* of a side]: having three sides, as a triangle. TRILAT'ERALLY, ad. *-ăl-lĭ.*

TRILETTO, n. *trē-lĕt'ō* [It.]: in *mus.,* a short trill.

TRILINGUAL, a. *trī-lĭng'gwăl,* or TRILIN'GUAR, a. *-gwėr* [L. *tres,* three; *lingua,* a tongue]: consisting of or expressed in three languages.

TRILITERAL, a. *trī-lĭt'ėr-ăl* [L. *tres,* three; *litĕra,* a letter]: consisting of three letters: N. a word consisting of three letters. TRILIT'ERALISM, n. *-ĭzm,* the system in the Semitic languages according to which the roots of the words have their three fundamental letters; the use of triliteral roots.

TRILITH, n. *trī'lĭth,* TRILITHON, n. *trī'lĭth-ŏn* [Gr. *treis,* three; *lithos,* a stone]: in *archæol.,* a monument, probably sepulchral, either standing alone or part of a larger work, and consisting of three stones, two uprights, connected by a continuous impost or architrave: the best known examples are at Stonehenge, England. TRILITHIC, a. *trī-lĭth'ĭk,* of or pertaining to a trilith; having the character of a trilith.

TRILL, v. *trĭl* [Sw. *trilla,* to roll: Dan. *trille,* to roll, to trundle: It. *trillare,* to quaver with the voice in singing: W. *treigl,* a rolling over]: to utter or play with a quavering or tremulous vibration; to sound in tremulous or quavering vibrations; in *OE.,* to trickle; to roll: N. a shaking or quavering of the voice in singing; a quavering or tremulous sound. TRIL'LING, imp.: ADJ. quavering; tremulous. TRILLED, pp. *trĭld.*

TRILLIACEÆ, *trĭl-lĭ-ā'sē-ē:* small nat. order of plants, belonging to the class Dictyogens (q.v.) of Lindley; herbaceous, with tubers or root-stocks, whorled leaves, hermaphrodite flowers; perianth of six leaves, the three inner leaves sometimes colored; six, eight, or ten stamens, the filaments extending beyond the anthers in awl-shaped points; the ovary free, 3-5-celled, with numerous ovules; the fruit succulent. The order is characterized by narcotic properties. The genus *Paris* (q.v.) belongs to it.

TRILLIBUB, n. *trĭl'lĭ-bŭb:* in *OE.*, tripe; a trifle; anything worthless.

TRILLION, n. *trĭl'yŭn* [L. *tres,* three, and Eng. *million:* F. *trillion*]: in the *Eng. system of notation,* a number represented by the third power of a million; a million of millions of millions, represented by 1, followed by eighteen ciphers; in the *F.* and *It. systems,* now generally used in the United States, a million millions, or a thousand billions, represented by 1, followed by twelve ciphers.

TRILLIUM, *trĭl'lĭ-ŭm* [word coined by Linnæus from Lat. *tri-,* threefold]: genus of *Liliaceæ,* of which 14 Amer. species are known, and 2 Asian. The name has reference to the ternary arrangement running through the calyx, styles, and leaves. The species of Trillium are curious and interesting plants, having a thick, short, fleshy root-stock, and unbranched stem topped with a whorl of 3 broad, deep green leaves, from which rises the beautiful sessile flower. The Purple Trillium is popularly called Indian Balm, Nosebleed, etc. In *Trillium erythrocarpum* (the Painted Trillium), deep-red lines mark the white petals. In *Trillium grandiflorum* of the e. states, and in *Trillium ovatum* of Cal., the white petals turn rose-color.

TRILOBATE, a. *trī-lō'bāt,* or TRILOBED, a. *trī'lōbd* [Gr. *treis,* three; *lŏbos,* a lobe]: having three lobes.

TRILOBITA, *trī-lō-bī'ta:* the trilobites, an order of fossil crustacea entirely confined to the paleozoic rocks. They are abundant specially in the Silurian period, and disappear in the lower members of the Coal-measures.

The body was covered with a chitinous shield, which consisted of a large united cephalic shield, a variable number of body segments, and a tail or pygidium, composed of a number of joints, more or less anchylosed. The eyes were sessile and compound. The lenses are frequently beautifully preserved, and in some species are so large that they can easily by seen with the naked eye. In *Asaphus caudatus,* each eye had at least 400 facets; and in the large *A. tyrannus* it is estimated that there are no fewer than 6,000. In some species a bifurcated plate has been found in the region of the mouth, which is believed to be a labrum; but no antennæ were detected until within a few years, when limbs were discovered by carefully made sections of the fossil. The members of the order varied greatly in size, some species being scarcely larger than a pin's head, while others, like *Asaphus gigas,* attained a length of 18 inches. It is probable that many named species may be only larval or transition forms of others. The minute *Agnosteus* is frequently found in such quantities as to indicate that it lived in shoals as if it were the larval form of some large trilobite. Trilobites have a remarkable resemblance to an embryonic stage of the living King-crab; and the

larval King-crab (Horseshoe Crab) no less resembles what is regarded as a larval trilobite, *Trinucleus*. They are now classed as orders of a crustacean sub-class, *Palæocarida*. More than 400 species have been described, and grouped into 50 genera.

TRILOBITE, n. *trī'lō-bīt* [Gr. *treis*, three; *lŏbos*, a lobe]: in *palæon.*, one of an extensive family of paleozoic crustaceans, the TRILOBITIDÆ, n. plu. *trī'lō-bĭt'ĭ-dē*, deriving their name from the three-lobed aspect of their bodies (see TRILOBITA). TRILOBITIC, a. *trī'lō-bĭt'ĭk*, like or pertaining to a trilobite.

TRILOCULAR, a. *trī-lŏk'u-lėr* [L. *tres*, three; *locŭlus*, a little place]: in *bot.*, having three cells or loculaments.

TRILOGY, n. *trĭl'ŏ-jĭ* [Gr. *treis*, three; *logos*, a discourse]: a series of three dramas, each complete in itself, the whole, however, forming but one poetical picture, as in Shakespeare's *Henry VI.;* in the *Athenian drama*, in which the term originated, *trilogy* was not only used in the above sense, but also applied to the exhibition of three tragedies on some special occasion, each tragedy being quite distinct in subject. A satyric drama was customarily added as a termination, whence the whole was sometimes termed a *tetralogy*. Every tragic poet that wished to take part in a poetic contest had to produce a Trilogy with a satyric drama at the Dionysiac, Lenæan, and Anthesteriac festivals. We possess only one perfect specimen of the classic Trilogy—the *Orcsteia* of Æschylus, which embraces the *Agamemnon*, the *Chæphoræ*, and the *Eumenides*. Beaumarchais's three comedies form a comic trilogy of the kind first mentioned; Schiller's *Wallenstein* is a trilogy; and so are Swinburne's *Chastelard, Bothwell,* and *Mary Stuart*.

TRIM, a. *trĭm* [AS. *trum*, steadfast; *trymian*, to establish, to set in order]: compact; firm; nice; neat, tidy; dressed; in good order; having everything necessary; N. ornaments; trappings; proper state of dress; adjustment, arrangement or condition as regards orderliness or balance; the state of a ship in regard to her cargo, ballast, masts, etc., by which she is well prepared for sailing: V. to put in due order for any purpose; to decorate; to dress; to clip, as the hair; to lop, as trees; to prepare, as a lamp; to dress timber; to make neat or tidy; to put a vessel in due order for sailing by adjusting the cargo, ballast, etc., that she may sit well in the water; to fluctuate between parties so as to appear to favor each in turn. TRIM'MING, imp.: N. necessary or ornamental appendages, as lace, ribbons, and the like; the act of one who trims; inconstancy. TRIM'MINGS, n. plu. the immediate surroundings of a dish at table, as bacon and *trimmings*. TRIMMED, pp. *trĭmd*. TRIM'MER, n. *-mėr*, one who trims; one who fits ornaments or arranges them; one who arranges the coal in a collier; one who adjusts his position to accord more or less with the different

sides in a contest; a time-server (see below); a flat brick arch for supporting a hearth in an upper floor of a building; a piece of wood in a wall to support the ends of a joist or rafter. TRIM'LY, ad. *-lĭ*, neatly; in good order. TRIM'NESS, n. *-nĕs*, neatness, snugness; state of being in good order. TRIM'MINGLY, ad. *-mĭng-lĭ*, in a trimming manner. IN TRIM, in proper order. TO TRIM IN, in *carpentry*, to fit, as a piece of timber into other work. TO TRIM UP, to dress; to put in order.—SYN. of 'trim, v.': to dress; decorate; shave; clip; lop; prune; adjust; balance.

TRIMBLE, *trĭm'bl*, ISAAC RIDGEWAY: American soldier: b. Culpeper co., Va., 1802, May 15; d. Baltimore, Md., 1888, Jan. 2. He was graduated from West Point in 1822, engaged in surveying military roads under the government in 1822-32, and then resigned to pursue the profession of civil engineering. He was afterward engaged as chief engineer on different railroads and at the outbreak of the civil war joined the confederate army. He was appointed colonel of engineers in 1861, had charge of the construction of defenses of Norfolk, Va., and later built the batteries at Evansport on the Potomac. He chose the position for the confederate forces at Cross Keys, 1862, June 8, was engaged at Gains' Mills, Slaughter Mountain, and at Manassas, and in 1863 was promoted major-general. He took part in the charge of Pickett's division at Gettysburg, where he lost a leg and was taken prisoner. He was exchanged in 1865, April, and reached Lynchburg on his way to rejoin Lee, the day after the surrender at Appomattox.

TRIMBLE, ROBERT: American jurist: b. Berkeley co., Va., 1777; d. 1828, Aug. 25. He removed with his parents to Kentucky in 1831, and there gained with little instruction sufficient education to enable him to teach. He later studied law, was admitted to the bar in 1803 and in that year settled at Paris, Ky., where he engaged in law practice. He was soon afterward chosen to the legislature, was appointed second judge of the court of appeals in 1808, and chief justice of Kentucky in 1810. He was United States district attorney in 1813, served as district judge of Kentucky in 1816-26, and from 1826 until his death was a justice of the United States supreme court.

TRIMEROUS, a. *trī mĕr-ŭs* [Gr. *treis*, three; *meros*, a part]: in *bot.*, composed of three parts—a *trimerous* flower having its organs in three or multiples of three.

TRIMETER, n. *trĭm'ĕ-tĕr* [Gr. *treis*, three; *metron*, a measure]: a poetical division of verse, consisting of three measures. TRIMETRIC, a. *trī-mĕt'rĭk*, or TRIMET'RICAL, a. *-rĭ-kăl*, consisting of three poetical measures; in min., applied to crystals having the axes of three kinds.

TRIMETHYLAMINE, n. *trī'mĕ-thĭl'ă-mĭn* [Gr. *treis*, three, and Eng. *methyl*, which see]: in *chem.*, volatile al-

kaline substance having the smell of stock-fish, obtained from herring-brine, etc., as a colorless gas, readily soluble in water, and having strong alkaline reaction. With acids it readily forms soluble salts. It occurs in large quantity in the pickle in which herrings (especially their roes) have been lying, and in the spirit in which old anatomical preparations have been long suspended; and (strange as it may appear) it imparts to the leaves of *Chenopodium olidum* their atrocious odor, and to the flowers of *Cratægus oxyacantha* (the common hawthorn) their agreeable fragrance. It is obtained by distillation from ergot of rye, from guano, the juice of the leaves of red beet-root, and from putrid yeast, and has been detected in small quantity in human urine and in the blood of the calf. It may be formed artificially by action of iodide of methyl on dimethylamine.

TRIM'MER: a time-server; one who tries to keep in with both sides or parties. Trimmer was a political term in use in the reigns of Charles II. and William III., originally applied to certain politicians of Charles's time, of whom the chief was Charles Montague, Earl of Halifax, who held opinions half-way between the extreme whigs and tories. Halifax adopted the name Trimmer as a title of honor, maintaining that everything good was a medium between extremes.—The same term was applied more generally by Dryden and other writers of the same period to all who, professing to be friends to monarchy, were at the same time enemies to the Duke of York, and who were equally obnoxious to the court and to the fanatical republicans.

TRIMMER, *trĭm'mėr,* SARAH (KIRBY): English author: 1741, Jan. 6—1810, Dec. 15; b. Ipswich. She had the advantage of acquaintance with Dr. Samuel Johnson, with whom she was a favorite. She was married 1762. Her publications, beginning 1780, included many school-books and other books for the young, on natural history, on scriptural study, etc.; and had much popularity. She also edited magazines for family instruction. Her *History of the Robins* is still read.

TRIMORPHIC, a. *trī-mŏr'fĭk* [Gr. *treis,* three; *morphē,* form, shape]: in *bot.,* having three forms of flowers in one species. TRIMOR'PHISM, n. *-fĭzm,* the character and condition of a trimorphic plant.

TRIMÛRTI, *trē-môr'tē* [from Skr. *tri;* three; *mûrti,* form]: the Hindu triad, *Brahma, Vishn'u,* and *S'iva,* viewed as an inseparable unity, though three in form. The *Padma-Purân'a* (see PURÂN'A), which, being a Purân'a of the Vaishn'ava sect, assigns to Vishn'u the highest rank in the Trimûrti, defines its character in the following manner: 'In the beginning of creation, the great Vishn'u, desirous of creating the whole world, became threefold: creator, preserver, and destroyer. In order to create this world, the supreme spirit produced from the

right side of his body himself as Brahma; then, in order to preserve the world, he produced from the left side of his body Vishn'u; and, in order to destroy the world, he produced from the middle of his body the eternal S'iva. Some worship Brahma, others Vishn'u, others S'iva; but Vishn'u, one, yet threefold, creates, preserves, and destroys; therefore, let the pious make no difference between the three.' And the *Matsya-Purân'a*, where speaking of *Mahat*, or the intellectual principle of the Sânkhya philosophy (see SÂNKHYA), says that 'Mahat becomes distinctly known as *three* gods, through the influence of the three qualities, goodness, passion, and sin; being one person and three gods—viz., Brahma, Vishn'u, and S'iva.' Apart, therefore, from sectarian belief, which makes its own god the highest, and gives him the attributes also of the other gods, *Trimûrti* implies the unity of the three principles of creation, preservation, and destruction, and as such belongs more to the philosophical than to the popular belief. When represented, the Trimûrti is one body with three heads: in the middle, that of Brahma; at its right, that of Vishn'u; and at its left, that of S'iva. The symbol of the Trimûrti is the mystical syllable *om*, where (*o* being equavalent to $a + u$) *a* means Brahma; *u*, Vishn'u; and *m*, S'iva. See OM.

TRINCOMALEE, *trĭng-ko-ma-lē'*: seaport town and magnificent harbor on the n.e. coast of Ceylon; 8° 34′ n., and 81° 12′ e.; on a bold peninsula, which divides the inner and outer harbors. It is a place of great antiquity, but its ancient renown was due more to religious than political or geographical considerations; for here the Malabar invaders of Ceylon built one of their most sacred shrines—the 'Temple of a Thousand Columns,' to which pilgrims flocked from all India. This celebrated shrine was demolished by the Portuguese, who fortified the heights with the materials from it, 1622. It was held next by the Dutch; but in 1672, during the rupture between Louis XIV. and the United Provinces, the French took Trincomalee, which was abandoned by the Dutch in a panic. In 1782 the French admiral, in the absence of the British commander, took possession of the fort, and the English garrison retired to Madras. It was restored to the Dutch the following year, and they retained it until the capture of Ceylon by the British 1795. The modern town, excluding the official buildings, is of poor appearance. There are Hindu temples in barbarous taste, and religious festivals and processions to which a similar epithet may be applied.—The Bay of Trincomalee is landlocked, and presents a scene of tranquil beauty; its fine expanse of water is still as an inland lake, and equally sheltered. It is the principal naval station in the Indian seas. 'On comparing this magnificent bay,' says Sir J. E. Tennent, 'with the open and unsheltered roadstead of Colombo and the dangerous and incommodious harbor of Galle, it excites an emotion of surprise and regret that

any other than Trincomalee should have been selected as the seat of government and the commercial capital of Ceylon. As a harbor, Trincomalee is renowned for its extent and security; but its peculiar superiority over every other in the Indian seas consists in its perfect accessibility to every description of craft in every variation of weather.' The mean temperature for the year at Trincomalee is 81°.4.—Pop. (1901) 11,791.

TRINCOMALEE' WOOD. See HALMALILEE.

TRINE, a. *trīn* [L. *trīnus*, threefold—from *tres*, three]: threefold: N. in *astrol.*, the aspect of planets 120 degrees distant from each other. TRINAL, a. *trī'năl*, threefold.

TRINE-IMMERSION: in baptism in certain portions of the primitive church, the dipping a person three times beneath the surface of the water at the pronouncing of each of the three names of the Holy Trinity. When circumstances rendered baptism by affusion necessary, the affusion also was trine as it is at the present day.

TRINERVIS, a. *trī-nėr'vĭs*, or TRINER'VATE, a. *-vāt*, and TRINERVED, a. *trī'nėrvd* [L. *tres*, three; *nervus*, a nerve]: in *bot.*, having three ribs springing together from the base.

TRIN'GA. See SANDPIPER.

TRINGLE, n. *trĭng'gl* [F. *tringle*, a curtain-rod]: a curtain-rod; in *arch.*, a name common to several little square members or ornaments, particularly one fixed over a triglyph.

TRINIDAD, West Indies: among the British islands in that archipelago the second in size and number of inhabitants; area 1,754 sq.m. and population 255,148. It lies just above lat. 10° n., so near to the coast of Venezuela, and in respect to fauna, flora, and geological formation so closely identified with South America, that, as has been well said, it 'is merely a severed fragment of the mainland, having exactly the same relations to it that Long Island has to the adjacent coast of New York and New England.' Its mountain ranges are not volcanic (like those which formed the Caribbees, stretching away toward the n.), but exemplify the e. and w. trend, which is found also in adjacent parts of South America and in the Great Antilles. The Gulf of Paria, enclosed between Trinidad and the Venezuelan coast, has two narrow outlets, *la Boca de la Sierpe* (the Mouth of the Serpent) on the s., and *la Boca del Dragón* (the Mouth of the Dragon) on the n.—both names bestowed by Columbus. (Compare 'Scritti di Cristoforo Colombo,' edited by Cesare de Lollis, Rome 1894.) Nearer the latter than the former, and overlooking the gulf from hills several hundred feet above sea-level, is Port of Spain, the capital of the island: a city of 54,100 inhabitants, celebrated for its views, cool breezes, and good climate—though in 1903

its hospitals were crowded with patients suffering from an infectious disease.

More than one third of the inhabitants of the island are East Indian coolies; even more numerous are the negroes and mulattoes, the latter of mixed African, Spanish, French, and English blood; there is a small English element, and the commerce of the ports attracts a few Venezuelans, Portuguese, etc. The number of East Indians was given in 1901-3 as 86,357; it was estimated at 98,000 in 1897-8 by Mr. Hill, in whose work, *Cuba and Porto Rico, with the Other Islands of the West Indies,* appears the following account: 'They are brought from Hindustan, under contract, at the expense of the colony, and under care of the government agents. They are apprenticed to owners for five years. . . . They dwell by themselves in little huts of a peculiar type, and maintain their own dress, priests, and religious ceremonials. Rice, cassava-roots, and fruits supply their scanty meals. They are bound by law to work nine hours a day for 280 days in the year, and receive a regular rate of wages, usually less than sixpence a day. The law concerning this apprenticed labor is very strongly enforced both upon the coolie and his employer. Each estate employing coolies is obliged to provide hospitals under the inspection of medical visitors, and all the labor arrangements are subject to the inspection of government agents, who visit the estates constantly and report each week to the agent-general of immigrants; he in turn reports to the governor, who has absolute authority to cancel the contract and remove any and all coolies from an estate. When the time of indenture is entered the coolie is entitled to transportation back to his native land. In lieu thereof he can make a new contract for a year, or he can remain and work wherever he chooses, and receive the amount of his return passage in cash. . . . Low as their wages are, most of them accumulate considerable sums, which are often converted into silver bracelets and bangles for the arms and ankles of their women, who thus preserve the family treasure.' The various forms of agriculture are shown in recent statistics of the areas devoted to each, namely, to cacao 190,800 acres; sugarcane 52,000 acres; ground provisions 34,500 acres; pasture 15,200 acres; cocoanuts 14,000; and coffee, 4,000 acres.

The average annual values of exports and imports, based upon statistics of the year 1899-1901, inclusive, are: exports from the island $12,671,815, and imports $12,813,040. But bullion and specie are included in both of these total amounts; furthermore, as stated by the collector of customs at Port of Spain, 'The great bulk of the Orinoco trade is done through Trinidad. There cargo is transferred to or from river steamers having a draft of about 10 feet. These are able, without leaving smooth water, to enter the Macareo, and by that channel to reach Ciudad Bolivar, which is about 300 m. from Port of

Spain.' (Compare Bulletin, 1903, Sept., Bureau of American Republics.) In other words, Port of Spain is the place of reshipment in the foreign trade of Venezuela.

Trinidad and the adjacent island of Tobago (area of the latter 114 sq.m.) are administered together as a British colony, having a governor (salary $25,000), executive council of six members, and legislative council of 22 members, all nominated. The annual appropriation for the support of the schools (237 public schools, with 30,706 pupils) is about $194,175. There are many private schools, and two colleges (the Queen's Royal and attached Roman Catholic). The distribution of the Christian population in Trinidad and Tobago is: Roman Catholics, 89,213; Church of England, 72,920; other denominations, 29,967. There are 81⅛ m. of railway; 1,147 m. of telegraph and telephone; and lines of steamships connecting the island with England, North America, Holland, and Venezuela. The police force numbers 567 men. Police volunteers and special constables are readily secured for service in emergencies, as was proved in 1903, March 23, when a riot occurred in the streets of the capital as a result of general disapprobation of the methods of the government, the special cause of complaint being an onerous water-tax. Banks are: The Colonial; a branch of the Union Bank of Halifax; and the Government Savings Bank.

TRINIDAD, Colo.: city and county-seat of Las Animas co.; situated in the extreme s.e. part of the state, 50 m. e. of the Continental Divide; on the Atchison, T. and S. F. and the Denver and R. G. R.R.'s. It was first settled in 1853 by Mexican ranchers; became a town under territorial law in 1872; and a city in 1877. Trinidad is situated in a coal-mining and agricultural region, and derives its business chiefly from mining and trade in agricultural products; there are also railroad shops and a wool-scouring mill; and three banks with a combined capital of $275,000. It contains a Carnegie public library, four public schools, including a high school, a business college, St. Joseph's Academy, and the San Rafael Hospital. The government is vested in a mayor and a board of aldermen of 10 members, elected bi-annually; the waterworks are under municipal ownership. Pop. (1900) 5,345; (1910) 10,204.

TRINIDAD, Cuba, city: province of Santa Clara; 4 m. from the s.e. coast; 40 m. s.e. of Cienfuegos. It was founded by Diego Velasquez in 1513. It is connected by railroad with its port, Casilda, and carries on a considerable trade; coffee was formerly its most important export, but the export of sugar is now increasing. It is well situated on high ground, and is one of the most healthful cities on the island. Pop. of the municipal district (1899) 24,271.

TRINITY, n. *trĭn'ĭ-tĭ* [F. *Trinité*, the Trinity—from mid. L. *trinĭtas* or *trinĭtātem*, a triad, the Trinity—from L. *trīnus*, threefold—from *tres*, three]: the eternal threefold distinctions—the Father and the Son and the Holy Spirit—in the One and only God (see below). TRIN'ITA RIAN, a. *-tā rĭ-ăn*, of or pertaining to the Trinity; pertaining to the doctrine of the Trinity: N. one who believes in the doctrine of the Trinity. TRIN'ITA RIANISM, n. *-ĭzm*, the doctrine that there are three distinct persons in the Godhead, yet but one God. TRINITY SUNDAY, the Sunday next after Whitsunday. TRINITY HOUSE, an institution, founded in 1518 and incorporated by Henry VIII., for the examination and licensing of pilots, erecting light houses, etc. TRINITY TERM, in *Eng. law* (see LAW-TERMS).

TRIN'ITY, DOCTRINE OF THE: doctrinal statement of the eternal subsistence in the One living God of the three distinctions (known in common language, for lack of any adequate Eng. term, as 'Persons'), which distinctions are revealed in Holy Scripture as *the Father and the Son and the Holy Spirit—One God.* This doctrine—in which the limited human intellect not only deals with the inscrutable mystery of Infinite and Eternal Being, but also must express its thought in the inadequate terms of human language—has necessarily found an immense variety of theological statements, and has been the centre of endless controversy. While these various statements are allowable, and many of them, indeed, instructive, the final appeal from them all—and for practical purposes the only return—is to the revelation of the great *fact* in Holy Scripture, as indicated above. The most elaborate statement of the doctrine is in the Athanasian Creed, which asserts that 'the Catholic faith is this: That we worship One God as Trinity, and Trinity in Unity—neither confounding the persons nor dividing the substance—for there is one person of the Father, another of the Son, and another of the Holy Ghost. But the Godhead of the Father and of the Son and of the Holy Ghost is all one; the glory equal; the majesty coeternal.'

It is admitted that the doctrine is not found as a developed theological formula in the Scriptures; but it is claimed to be clearly revealed in its elements in the New Testament, and to be indicated in many statements and revelations of the Old Testament. Believers in this doctrine refer in the Old Testament to the apparent distinction, recognized in the revelations to the patriarchs and Moses, between Jehovah and 'the Angel of Jehovah;' the mode in which 'the Spirit' and 'Word' of God, and 'Wisdom' (Proverbs viii.), are spoken of; and the gradual unfolding of the doctrine of a 'Messiah.' In the New Testament Scriptures the doctrine (or, rather, fact) is found in the Trinitarian formula of baptism, Matt. xxviii. 19; in the benediction by the apostle Paul, II Cor xxiii. 14; and, in numerous passages, in the general character of the claims and prerogatives of Jesus Christ, including the ascription to him of the designation 'the Son of God;' and in the functions attributed to the Holy Spirit. The evidence is held con-

clusive of the equal divine nature and yet personalized distinction of the Son and the Spirit with God the Father. It is generally conceded, however, that the Christians of the 2d, and even of the 3d c., did not bring the doctrine into clear philosophical statement: they were content for the most part to use scriptural expressions in speaking of the Father and the Son and the Spirit, without defining articulately the relation subsisting in the Trinity. It was not till the progress of opposing heresies sought, by philosophical arguments, on the one hand to lower the divine dignity of Christ (Ebionitism—see EBIONITE—in its various forms, and Arianism—see ARIUS); or, on the other hand, to confound the personality of Christ with God the Father—a heresy known in its special form as Patripassianism (see PATRIPASSIANS: MONARCHIANISM)—that the church was led to define in the Nicene Creed the relation of the Son to the Father; and further, in the Nicæno-Constantinopolitan Creed, the relation of the Spirit to the Father (see NICENE: CONSTANTINOPLE, COUNCILS OF: HOMOIOUSIAN). This creed was directed specially against the opinions of Arius. A further clause was afterward added, known as the *filioque* clause (see FILIOQUE), which determined the procession of the Spirit from the Son as well as from the Father; but this clause, and the doctrine which it embodies, was never accepted by the Eastern Church, to whose finer speculative genius is due the determination of the controversies which began in the 3d c. regarding the divine being. The Western or Latin Church had a less refined genius for such speculations; and, so far as it meddled with them, has imparted to them a coarser and more contradictory aspect, e.g., in the 'Athanasian Creed,' now well understood to be of Latin and not of Greek origin.

It is not our part here to criticise the evidence for the doctrine of the Trinity, or the validity of the doctrine itself; it is enough to say that the evidence, briefly sketched in the above outline, has been accepted as satisfactory, not only by the Rom. Catholic and oriental communions, but also by all the great Prot. communions. The notable exception in modern times to the reception of the doctrine is in the case of the Socinians or Unitarians (see SOCINUS, FAUSTUS: SOCINUS, LÆLIUS: UNITARIANS), who occupy in their teaching very much the position of the ancient Humanitarians (Ebionites). They reject the doctrine of the Trinity as incredible, and mostly regard Christ merely as a higher prophet (but see SWEDENBORG, EMANUEL). There have always, however, been various thinkers within the Christian Church, e.g., Dr. Samuel Clarke, beginning of the 18th c., who, accepting generally the doctrine of the Trinity, have rejected the special terms in which it is defined in the creeds.

On this, as on other doctrines of the Christian faith, it is the *fact* and not its *mode* which is revealed in the Scriptures: speculations as to its mode, and various philosophical inferences from it, may be of much or little value, but have no place as authoritative Christian doctrine. An instructive statement—first of the doctrine in its substance, then of

some theoretical statements of it—is in these words of Prof. Edwards A. Park (*Bibliotheca Sacra*, 1881, Apr.): 'A theologian may adopt the following definition of the Trinity: The Father is God; the Son is God; the Holy Spirit is God; the three are distinct from each other by a necessity of their very substance; neither is God without the others; and there is only one God. Here is the doctrine, stated without using technical terms.—A theory of the doctrine is, that God is only one person in the psychological sense of that word, but exists in three distinct modes —ontological and necessary modes of subsistence, and not modes of mere action or manifestation. The first of these modes is the ground on which it is distinctively proper for Him to perform one class of official acts; the second is the ground on which it is distinctively proper for Him to perform another class of official acts; the third is the ground on which it is distinctively proper for Him to perform a still different class. As each mode is distinct from the other two, each is called a *distinction*. As each is the ontological basis of a distinct property, each is called a *subsistence*, an *hypostasis*. As each is the ontological basis on which personal acts ultimately depend, each is called a *person* in a technical, not in the philosophical, sense of the word. As each of these modes is relative to the other two, each is called an *internal relation*. God is said to exist in the three modes, distinctions, persons, relations; and the three are said to exist in Him; and the three are said to *be*, as well as to be *in*, the one God. On this theory the different ὑπόστασεις have only one consciousness, one will, one set of attributes; the unity being plain, the triality being mysterious. A different theory is that the three divine persons have each a distinct consciousness, a distinct will, a distinct set of attributes; the unity being mysterious, and the triality plain. A modification of this theory is that the Godhead consists of three minds, each one of which has a consciousness of the other two, and is thus one with them. A not uncommon theory is that the infinite mind differentiates itself from itself, and then unites itself with itself; the subject projecting itself into an object of consciousness is the first Hypostasis; the object being known by the subject is the second Hypostasis; the knowledge identifying the object with the subject, or the love uniting the two, is the third Hypostasis. This general proposition, in diversified forms, lies at the basis of theories which do not exhibit it on the surface. In the earlier period of his life, Melanchthon said: "These mysteries (the doctrines of God, the Trinity, the person of Christ) are better reverenced than inquired into." At a later period he defined the Trinity as "the eternal necessary process of the divine self-consciousness, in which God, whose thoughts are realities, eternally sets Himself over against Himself, but also again unites with Himself."'

See (besides references above noted) PERSON: CHRIST, THE: CHRISTOLOGY: LOGOS: SON OF GOD, THE: HOLY SPIRIT: GOD: also references under these titles.

TRIN'ITY RIVER: in Cal., rising near the Coast Range, and flowing first n.w., then s.w., through a country of rich gold mines, into the Klamath river, in Humboldt co.; length estimated 130 miles.

TRIN'ITY RIVER: in Texas, formed by the union of two streams, West Fork and Elm Fork, which rise near the n. boundary of the state, and unite 150 m. s.e.; the main stream flowing thence 550 m. in the same general direction to Galveston Bay, about 40 m. n. of Galveston. It is navigable 300 to 500 miles.

TRIN'ITY CHURCH, in New York: see NEW YORK (City).

TRIN'ITY COLLEGE: educational institution in Hartford, Conn., controlled by the Prot. Episc. Chh. It was founded 1824 under the title Washington College; changed to T. C. 1845. The college site was sold to the state of Conn. 1872, to be used for the state capitol, and the institution removed to its present fine location within the limits of Hartford. On the new grounds (78 acres) the college building is a great quadrangle measuring 1,050 by 376 ft., in the Early English style. The college confers the degrees of A.B., B.S., and B.L. In 1904 a course in civil engineering, three years in length, was added to the curriculum. In 1904 there were 125 students, and the faculty numbered 20; the library contained 46,000 volumes. There are many scholarships, one fellowship, and a graduate fellowship. The first president, and the founder of T. C. was the Right Rev. Thomas C. Brownell, D.D.

TRIN'ITY COLLEGE, Cambridge: one of the colleges of Cambridge Univ., England; founded by Henry VIII., 1546, on the site, and partly out of the revenues, of several more ancient foundations, of which two deserve notice. King's Hall (*Aula Regis*) was named from its founder (1337), Edward III., whose father, Edward II., had maintained 32 scholars, called king's scholars, but had died before completing his intentions. The master's stipend was fourpence per day, and that of each scholar twopence and two robes at Christmas. The revenues of King's Hall at the time of its surrender to Henry VIII. amounted to £214 per annum. Michael House was founded 1324, by Hervey de Stanton, chancellor of the exchequer to Edward II.: he dedicated his college to the Trinity, the Virgin Mary, St. Michael the Archangel, and All Saints.—When Henry VIII. united these smaller foundations into the one great college, thenceforth called TRINITY COLLEGE, besides other endowments he added the estates of 27 dissolved monasteries, making the gross revenues about £1.700 per annum. Queen Mary added very largely to these benefactions, and provided for 20 additional scholars, 13 poor scholars or sizars, 4 chaplains, and a choir. Queen Elizabeth gave the college a new set of statutes, by which it was governed until the reign of Queen Victoria, when these statutes were revised. Subsequently, under the Cambridge Univ. Commission (1859–60), new statutes were again given, making important changes. Such fellows as fill the

office of bursar, tutor, or lecturer in the college, or prof. in the university, are exempt from the necessity of taking holy orders, which must otherwise be done by all fellows within seven years after taking the degree M.A. Marriage is permitted to fellows in a few exceptional cases, and to the chaplains and librarian. The master of T. C. must be in holy orders, and the appointment is in the gift of the crown. The following are some of the more eminent names in the list of masters: John Whitgift, who was raised to the see of Worcester; Thomas Nevile, Dean of Canterbury (d. 1615), who built the greater part of the cloistered court known by his name. To Dr. Barrow, who was made master 1672, the college owes the finishing of Nevile's Court, and the erection of the Library, from designs by Sir Christopher Wren. The famous Dr. Bentley was master 1700–42. William Whewell (q.v.) was one of the most distinguished men that this college has produced: he was also its munificent benefactor, and he bequeathed to it his large fortune. A few of the many other names of distinction are: Lord Bacon (died 1626); Sir Edward Coke (1634); Cowley the poet (1667); Lord William Russell (beheaded 1683); John Dryden (1701); Samuel Pepys (1703); Sir Isaac Newton (1727); Richard Porson (1808); Lord Macaulay (1859); also Prof. H. A. J. Munro, ed. of *Lucretius*, and Lord Tennyson, poet-laureate. The foundation now consists of a master, 60 fellows, and 74 scholars.

The buildings, except the Hall and the Library, are not of any architectural pretensions. The statue of Newton by Roubiliac, in the antechapel, is one of the finest modern statues.—See Cooper's *Annals and Memorials of Cambridge;* Dyer's *History;* and the *University Calendar*.

TRIN'ITY COLLEGE, Dublin: see DUBLIN, UNIVERSITY OF.

TRIN'ITY COLLEGE, Oxford: one of the colleges of Oxford Univ., England. In 1290 Richard de Hoton, Prior of Durham, founded Durham College at Oxford, for the education of the student-monks of Durham. At the dissolution of the monasteries, the property of this institution was transferred by Henry VIII. to the newly erected chapter of Durham Cathedral. Its site and buildings, however, passed into the hands of Sir Thomas Pope, who, 1554, founded a college on the spot, to be called T. C., for the maintenance of 20 scholars, of whom 12 were to be fellows, and 8 scholars properly so called. In 1557 he added four scholarships; also another was added, besides two exhibitions. The fellowships and scholarships are now thrown open without restrictions; the latter are tenable for 20 terms, value £80 a year, besides rooms. This is the first college, after Balliol, founded by a layman; it is remarkable also as having been, like St. John's, founded by a Rom. Cath. after the Reformation. It presents to 11 benefices.

TRINITY COLLEGE: at Durham, N. C. It was founded as a school of secondary grade in 1838, and was then located in Randolph co.; in 1851 it became a normal college, and the next year established a full college course and was granted power to confer degrees. In 1857 it was placed under the control of the North Carolina conference of the Methodist Episcopal Church, South, and in 1859 the name was changed to Trinity College. During the civil war the college was compelled to close; and was reopened in 1866. In 1891 it was moved to its present site in Durham. Women were admitted to all privileges of the college in 1896. The college offers three groups of studies, all leading to the degree of A.B., the first group requires Latin and Greek in the first two years, the second group substitutes French or German for Greek, and the third group is for students intending to do advanced work in mechanical, electrical or civil engineering; the work of the last three years is partially elective. Provision is also made for graduate work for which the degree of A.M. is conferred. There are 50 scholarships, and two loan funds for the aid of poor students; tuition is free for those studying for the ministry. The grounds, consisting of 73½ acres, are known as Trinity College Park, and are under the municipal government of Durham; the buildings include the Washington Duke building, the Crowell Science building, the Epworth building, the Mary Duke building, the Craven Memorial Hall, the Angier Duke gymnasium, a dormitory (erected 1902) and the library (completed 1903). The productive funds amount to $429,000; the students number 375, and the faculty 23.

TRINITY COLLEGE: a Roman Catholic institution for the higher education of women, located at Washington, D. C. It was founded by the Sisters of Notre Dame (Namur), and was first opened to students in 1900. It offers two college courses leading to the degrees of A.B. and B.L. respectively; and has no preparatory department. The library contains over 5,000 volumes; the income is $25,000; the students number 60.

TRINITY HALL, Cambridge: one of the colleges of Cambridge Univ., England (distinct from Trinity College); founded 1349-50 for scholars of canon and civil law, as well as for the education of clergy, by William Bateman, Bp. of Norwich, co-founder also of Gonville and Caius College. A great pestilence had recently swept away most of the clergy of his diocese, so that (according to a bull of Pope Clement VI., Avignon, 1349) there were not less than 1,000 parishes in the diocese void of incumbents. The first master was Robert de Stratton. There are 13 fellowships, of which 10 may be held by laymen for 10 years, and are not vacated by marriage. There are also 5 law-studentships, 16 scholarships, and 2 exhibitions.—See Cooper's *Memorials and Annals*, and

Dyer's *History of Cambridge;* also the *University Calendar.*

TRIN'ITY HOUSE (properly, The Corporation of the Elder Brethren of the Holy and Undivided Trinity): corporation intrusted with the regulation and management of the light-houses and buoys of the shores and rivers of England, under superintendence of the board of trade.

TRINITY SUNDAY: the Lord's Day immediately following the Penticost Day or Whitsunday; so called as being set aside for the special honor of the Holy Trinity. The date of its origin has occasioned much controversy. No such festival as Trinity Sunday was known to the fathers of the early centuries: in the older liturgies Trinity Sunday was regarded as merely the octave of Pentecost. Evidence of its non-acceptance by the general church before the 9th or 10th century is the absence even to this day of any corresponding festival in the calendar of the Greek Church; and though it seems quite certain that it was introduced in certain particular churches of the West at earlier and varying dates, its general establishment for the whole Western Church dates from a decree of Pope John XXII. (d. 1334). Nevertheless, the mass and office peculiar to the day are traceable, at least in part, in several sacramentaries and other liturgical books of the earlier centuries.

TRINITY UNIVERSITY: situated at Toronto, Canada, and since 1903 in federation with the University of Toronto. The university was founded by Royal Charter in 1852, and at that time was organized with the faculties of Arts, Divinity and Medicine, the latter two having been previously established independently. Since that time all courses of the university have been opened to women, and Saint Hilda's College, the residential building for women, erected. New departments have also been added and the faculty of Medicine reorganized until at the time of the federation with the University of Toronto the organization of Trinity, with its affiliated schools, including Trinity College (the faculty of Arts), Saint Hilda's College, the faculty of Divinity, the faculty of Law, Trinity Medical College, the Ontario Medical College for Women, the Toronto Conservatory of Music, the College of Pharmacy, and the Dental College. The federation of Trinity and Toronto was legalized by the proclamation of the lieutenant-governor-in-council, 1903, Nov. 28, and took effect 1904, Oct. 1. The distinctive feature of Trinity in comparison with the other schools included in the University of Toronto is its provision of residential buildings for students in the Arts department; in this it has been modelled after the English universities of Oxford and Cambridge. There are also certain courses in religious subjects in the regular Arts course; some of which are prescribed for only such students as are members of the Church of England.

TRINKET, n. *trĭng'kĕt* [imitative of the rattling which pleases children with their toys: Port. *trinco*, snapping of the fingers: F. *traquet*, a rattle: Wal. *trankot'*, a rattle, a trifle]: anything small and of no great value; any small ornament for the person made of gold, silver, pebble, or the like; a toy: V. to communicate with; to intrigue; to have mercenary dealing with. TRIN'KETER, n. *-ĕr*, one who intrigues.

TRINKET, or TRINQUET, n. *trĭng'kĕt* [F. *trinquet*, the topgallant: Sp. *trinca*, a rope for making fast]: the highest sail of a ship; a topgallantsail.

TRINODA NECESSITAS, *trī-nō'da nē-sĕs'sĭ-tas:* three species of contributions to which, in Anglo-Saxon times, all the lands of England, whatever their tenure, not excepting those of the church, were subject—viz.: *Bryge-bot*, for keeping the bridges and highways in repair; *Burg-bot*, for keeping the fortresses in repair; and *Fyrd*, for maintaining the military and naval force of the kingdom.

TRINOMIAL, a. *trī-nō'mĭ-ăl* [L. *tres*, three; *nomen*, a name]: consisting of three terms, as the technical name of a sub-species in *zool.* or *bot.*, or as an algebraic quantity: N. an algebraic quantity consisting of three terms; a trinomial expression; a name consisting of three terms.

TRIO, n. *trī'ō* or *trē'ō* [It. *trio*, three united—from L. *tres*, three]: three united; three persons in company or acting together; a musical composition requiring three performers; also, a movement in $\frac{3}{4}$-time, following a minuet or other movement, and in a different key, but always leading back to the previous movement in the original key.

TRIŒCIOUS, a. *trī-ē'shŭs* [Gr. *treis*, three; *oikos*, a house]: in *bot.*, producing male, female, and hermaphrodite flowers, each on separate plants. TRIŒCIOUSLY-HERMAPHRODITE, another name for *trimorphic*.

TRIOLET, n. *trī'ō-lĕt* [see TRIO]: in *verse*, a stanza of eight lines, of which the seventh and eighth are the same as the first and second, and the fourth is the same as the first.

TRIONAL: a hypnotic, used to produce sleep in cases when there is no pain; obtained in colorless, odorless crystals, by passing dry hydrochloric acid into a mixture of anhydrous mercaptan and methyl-ethyl ketone, and oxidizing the product; formula, $C_8H_{18}S_2O_4 = CH_3(C_2H_5)C(SO_2.C_2H_5)_2$. It is soluble in alcohol, ether, and water, and melts at 76° C.

TRIONES, n. plu. *trī-ō'nēz* [L. *trĭōnēs*, plowing-oxen]: in *astron.*, the seven principal stars in the constellation Ursa Major, popularly called Charles's Wain or the 'Dipper.'

TRIOR, n., or TRIER, n. *trī'ĕr* [from TRY, which see]: a person appointed to ascertain whether a challenge to a panel of jurors, or to a single juror, is just.

TRIOXIDE, n. *trī-ŏks'īd* [Gr. *treis*, three, and Eng. *oxide*]: metallic anhydride having a strong acid character: see MONOXIDE.

TRIP, v. *trĭp* [Ger. *trapp-trapp-trapp* represents the sound of the footfall: Dut. *trippen*, to tread: Dan. *trip*, a short step: Low Ger. *trippeln;* Sw. *trippa*, to stumble, to slip. OF. *triper*, to tread (see TRAMP)]: to run or step lightly or nimbly; to take short quick steps; to strike the foot against something so as to fall or stumble; to cause to fall by striking the feet suddenly from under the person, with *up*, as 'to trip up;' to overthrow or supplant; to fail; to err: N. a stepping lightly or nimbly; a stumble or fall by striking the foot against an object; a false step; a stroke or catch in wrestling; a failure; a mistake; a slight error; a journey or excursion; a short voyage or tour. TRIP'PING, imp.: ADJ. quick; nimble: N. the act of tripping; a light dance. TRIPPED, pp. *trĭpt*. TRIP'PER, n. *-pĕr*, one who trips. TRIP'PINGLY, ad. *-lĭ*, in a light, graceful, or nimble manner. TO TRIP THE ANCHOR, to free the anchor from the bottom. TO CATCH TRIPPING, to detect any one committing an error or mistake.

TRIPARTED, a. *trī-pârt'ĕd:* in *bot.*, parted into three segments.

TRIPARTITE, a. *trī-pâr'tīt* [L. *tres*, three; *partītus*, pp. of *partĭor*, I divide]: divided into three; having three corresponding parts or copies; made by three parties, as a treaty: in *bot.*, deeply divided into three segments. TRIPAR'TITELY, ad. *-lĭ*. TRIPARTITION, n. *trī'pâr-tĭsh'ŭn*, a division by three.

TRIPE, n. *trīp* [It. *trippa;* Sp. and Port. *tripa;* F. *tripe;* W. *tripa*, belly, guts]: originally, the entrails; the large stomach of ruminants cleaned and prepared for food. TRIPE'MAN, n. one who sells tripe. TRIPESTONE, a name given to *anhydrite* when composed of contorted plates, which bear a sort of resemblance to the convolutions of the intestines. TRIPE-VISAGED, a. having a face flabby like tripe.

TRIPEDAL, a. *trī-pē'dăl* [L. *tres*, three; *pes* or *pĕdem*, a foot]: having three feet.

TRIPE DE ROCHE, *trēp dĕh rōsh:* certain lichens, species of *Gyrophora*, which Canadian hunters are often forced to use as food. They are nutritious, but bitter, nauseous, and purgative. They have a leafy peltate thallus, variously lobed and notched—in *G. proboscidea* of smoky-brown color, and in *G. erosa* almost black; the shields are round, without stalks, covered with black membrane, and marked with circles and plaits on the surface. These lichens grow on rocks in northern regions, or on high mountains. They are abundant in Spitzbergen, and a species, well known as a native of the Scottish mountains, is found in the Himalaya above 18,000 feet.

TRIPENNATE, a. *trī-pĕn'nāt*, or TRIPIN'NATE, a. *-pĭn'-nāt* [L. *tres*, three; *penna* or *pinna*, a feather]: in *bot.*, applied to a compound leaf three times divided in a pinnate manner.

TRIPETALOUS, a. *trī-pĕt'ă-lŭs* [Gr. *treis*, three; *petălon*, a leaf]: in *bot.*, having three petals or flower-leaves.

TRIPHTHONG, n. *trĭf'thŏng* or *trĭp'-* [Gr. *treis*, three; *phthonggē*, sound]: a combination of three vowels in one sound, as *eye;* a trigraph. TRIPHTHON'GAL, a. *-thŏng'găl*, pertaining to or consisting of a triphthong.

TRIPHYLLOUS, a. *trī-fĭl'lŭs* [Gr. *treis*, three; *phullon*, a leaf]: in *bot.*, having leaves in whorls of three, or producing only three leaves

TRIPINNATE: see TRIPENNATE.

TRIPINNATIFID, a. *trī'pĭn-năt'ĭ-fĭd* [L. *tres*, three; *pinna*, a feather; *findĕrĕ*, to divide]: in *bot.*, pinnatifid with the segments twice divided in a pinnatifid manner.

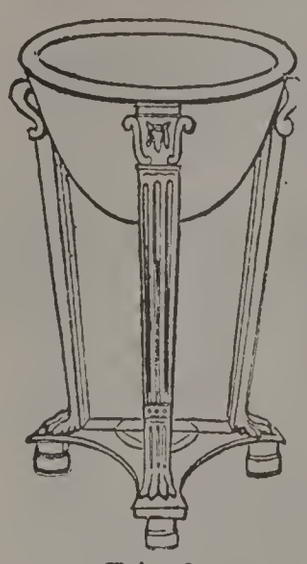
TRIPIT'AKA: see PIT'AKA.

TRIPLE, a. *trĭp'l* [F. *triple*—from L. *triplex*, threefold—from *tres*, three; *plico*, I fold]: consisting of three united; threefold; three times repeated; in *OE.*, third: V. to make thrice as much or as many, usually written *treble.* TRIP'LING, imp. *-lĭng.* TRIPLED, pp. *trĭp'ld.* TRIP'LY, ad. *-lĭ*, in a triple or threefold manner. TRIPLE-CROWNED, a. having three crowns; having the triple crown or tiara as the pope. TRIPLE TIME, in *music*, a certain time, so called from each bar possessing a rhythm of three beats. TRIP'LET, n. *-lĕt*, three of a kind; three united; three lines of verse that rhyme together; three notes sung or played in the time of two, as when a minim is divided into three crotchets one of three children at a birth. TRIP'LICATE, a. *-lĭ-kāt*, composed or consisting of three; threefold: N. a third paper or thing corresponding to two others of the same kind; a set of three, as foreign bills of exchange are usually drawn in *triplicate.* TRIP'LICA'TION, n. *-kā'shŭn*, the act of making threefold or adding three together. TRIPLICITY, n. *trĭ-plĭs'ĭ-tĭ*, or TRIPLENESS, n. *trĭp'l-nĕs*, state of being threefold. TRIPLITE, n. *trĭp'līt*, a mineral phosphate of manganese occurring in massive or coarsely granular aggregates, so called from its being cleavable in three directions at right angles to each other TRIPLE ALLIANCE, name of three different alliances: (1) A treaty concluded 1668 at the Hague between England, Holland, and Sweden, having for its object the protection of the Spanish Netherlands and the checking of the conquests of Louis XIV.—(2) An alliance 1717 between Britain, France, and Holland, against Spain, which included among its stipulations that the Pretender should quit France, and that the treaty of Utrecht should be carried into effect regarding the demolition of Dunkirk. The Prot. succession was guaranteed by this treaty in England, and that of the Duke of Orleans in France.—(3) An alliance (known as the *Dreibund*) formed about 1883 between Germany, Austria-Hungary, and Italy, as a check to Russia and France.

TRIPLICOSTATE, a. *trĭp'lĭ-kŏs'tāt* [L. *triplus*, threefold; *costa*, a rib]: in *bot*, having three ribs proceeding from above the base of the leaf.

TRIPLOBLASTIC, a. *trĭp'lō-blăs'tĭk* [Gr. *triploos*, threefold; *blastos*, a germ]: in *zool.*, having embryos in which the blastoderm separates into three layers

TRIPOD, n. *trī'pŏd* [Gr. *tripous*, three-footed, also a tripod—from *treis*, three; *pous* or *poda*, a foot]: a three-legged stool or table; a portable three-legged frame or stand, jointed at the top, used to support a camera, surveying-instrument, or the like, when in use; in classical times, a three-legged caldron: a bronze altar supported on three legs, with three rings at the top to serve as handles. Of this description seems to have been the T. at Delphi, from which the Pythian priestess delivered her oracles, with the addition, however, of a round flat plate on the top, on which the priestess sat while giving the response, while a laurel wreath lay on it at other times. Tripods of similar form were given as prizes at the Pythian games; and at Athens a T. was considered an appropriate reward for a successful choragus. Some beautiful tripods were found at Pompeii, and there are interesting specimens in the Brit. Museum. Analogous to the classic T. is Thor's *kettle* in Scandinavian mythology, probably the original of the witches' caldron.



Tripod.

TRIPOLI, *trĭp'ō-lĭ:* former regency, now a vilayet, of the Ottoman empire, and the most easterly of the Barbary States, n. Africa; bounded w. by Tunis, s. by the Libyan Desert and Fezzan, e.—if we include the plateau of Barca (q.v.)—by Egypt, and n. by the Mediterranean; estimated 399,000 sq. m.; pop. uncertain, but prob. between 800,000 and a million. T. is less mountainous than the rest of Barbary, the Atlas range terminating here in two chains parallel to the coast, never higher than 4,000 ft. There are no rivers, and rain seldom falls during the long hot summers; but the dew is copious, and supports vegetation in favored spots. The coast region (about 1,100 m. long) is very fertile about Tripoli and Mesurata, where all sorts of tropical fruits, grain, wine, cotton, madder, etc., are produced; but further e., along the shores of the Gulf of Sidra, sandy desolation reigns. The interior yields senna, galls, and the finest dates; the carob and lotus are indigenous. Sheep and cattle are reared in great numbers, and T. is noted for its small but excellent horses, and its strong and handsome mules. The commerce consists in exporting, principally to Malta and the Levant, the products of the country and of interior Africa (gold-dust, ivory, natron), brought in caravans across the desert. The imports (chiefly European manufactures) have been declining gradually of late years, from two causes. The *first* is the new direction which the trade of central Africa is assuming: by the Niger and its great tributary, the Benue, European manufactures are more rapidly and economically conveyed to the northern intertropical regions than by the tedious overland route of the Great Sahara. The *second* cause is the abolition of the

slave-trade, which has stopped the demand for the commodities that supported the traffic.

T. is subdivided into four *livas* or provinces—Tripoli, Benghazi, Mesurata, and Gadames. The gov gen. has the title, rank, and authority of a pasha of the Ottoman empire: he is appointed by the sultan, and in his turn appoints the *beys* or subordinate governors of the provinces. The military force consists of a body of Turkish soldiers, formerly about 3,000, but increased 1885 to 17,000 in number, whose business is to keep down insurrections, but who were formerly wont to vary it by creating them. The natives (Libyan Berbers, Moors, and a few Arabs) pay to the imperial govt., as tribute, a tenth of all products of the soil; and there is a special tax on every olive-tree and date-tree, on every camel, on all horned cattle, on sheep and goats, and on Jewish residents. Little wisdom and less justice are shown in either the imposition or collection of the taxes.

In ancient times T. (when we first read of it) appears to have formed the most w. portion of the territory of Cyrenaica (Barca), or at least to have been tributary to the Cyrenæans, from whom it was wrested by the Carthaginians. It passed next to the Romans, who included it within the province of Africa, and gave it the name *Regio Syrtica*. About the beginning of the 3d c. it became known as *Regio Tripolitana* (on account of its three principal cities, Œa, Sabrata, and Leptis, which were leagued together—whence its present name T.), and was raised to the rank of a separate province probably by Septimius Severus, a native of Leptis. Like the rest of n. Africa, it was conquered by the Arabs (see BARBARY), and the feeble Christianity of the natives was supplanted by a vigorous and fanatical Mohammedanism. In 1552 the Turks got possession of it, and have since been its rulers, though the authority of the sultan, till 1835, had been virtually at zero for more than a century. In that year an expedition was dispatched from Constantinople; the ruling dey, Karamanli (in whose family the sovereignty had continued since 1714), was overthrown and imprisoned; a new Turkish pasha, with vice-regal powers, was appointed, and the state made an eyalet of the Ottoman empire. Several rebellions (notably 1842 and 44) have been suppressed.

TRIP'OLI, called by the Turks *Tarabûlûs*, and probably the *Œa* of antiquity: city, cap. of the Turkish n. African vilayet of T.; on a rocky promontory in the Mediterranean, which forms a small bay. It is surrounded by high walls with bastions, and is irregularly built, but has beautiful gardens. There are 12 mosques, 3 synagogues, and 2 Christian churches. The city still has a typical Moorish aspect. Though the majority are Moslems, nearly all the trade is in the hands of Jews and Christians. The overland trade to Sudan has greatly fallen off, but there is considerable trade with Malta.—Pop. about 35,000.

TRIP'OLI (mod. Ar. *Tarâbulus*, anc. *Tripolis*): seaport, one of the chief commercial towns of Syria, cap. of a pashalic in the eyalet or govt. of Sidon; near the Mediter-

ranean coast, on the e. border of a small triangular plain extending into the sea, and on both sides of the river Kadîsha; 50 m. n.n.e. of Beyrout. The town is substantially built of stone, with many remains of mediæval architecture, and is supplied with excellent water by an aqueduct. It is surrounded by gardens of orange, lemon, mulberry, apricot, and other fruit trees, which are planted also in the town itself, and give the place a rich and picturesque appearance; but the low marshy neighborhood renders it unhealthful. On the left side of the river stands the castle built by Count Raymond of Toulouse, 12th c., when the city was taken by the Crusaders. At the n.w. apex of the small plain, 1½ m. from T., is its port, El-Mîna (the Landing-place), or the Marina, a small fishing-village. The harbor, like other harbors on the Syrian coast, scarcely deserving the name, is formed by a line of low rocky islets. The trade of T. has declined, being superseded by that of Beyrout; its exports now consist chiefly of silk, sponges, and tobacco: there are manufactures of soap. T. is regularly visited by the steamers of the French Messageries. It is the see of a Greek bishop. —Pop. estimated 17,000; with its port, 24,000—nearly half being Christians.

The anc. T., an important maritime city of Phœnicia, stood on the plain, where immense numbers of granite shafts and other relics of antiquity are still found. Its name (*Three Cities*, or the *Triple City*) was from its being founded by the cities of Tyre, Sidon, and Aradus, as an entrepôt for trade and a point of federal union. It was for many centuries a place of great commercial importance.

TRIPOLI, n. *trĭp'ō-lĭ:* a polishing-powder originally brought from *Tripoli*, in Africa, but now from many other places—an infusorial earth of a whitish-gray or yellow color, soft, light, and friable, yielding readily to the nail, and crumbling down in water like rotten-stone. It has a coarse, dull, earthy fracture, is rough to the touch, and is of gray, yellow, or red color. The particles which compose it are the siliceous frustules of *Diatomaceæ* and the curious forms of Polycistines (protozoan), which occur unaltered in it, and are united without visible cement. Ehrenberg estimated that every cubic inch of Bilin T. weighing 220 grains contained 41,000,000,000 of these minute water-weeds. Deposits of T., often called infusorial earth, occur in the Tertiary rocks in every quarter of the world. TRIP'OLINE, a. *-lĭn*, pertaining to tripoli.

TRIPOLITZA, *trē-pō-lĭt'sâ* ('three cities'), official name TRIPOLIS: town of Greece; under the former Turkish rule, cap. of the Morea; now chief town of the nomarchy or govt. of Arcadia; 22 m. s.w. of Argos, 39 s.w. of Corinth, in a plain 3,000 ft. above sea-level. It derives its name from being the modern representative of three anc. cities, Tegea, Mantinea, and Pallantium. In 1821 it was stormed by the Greek insurgents, and 1828 razed to the ground by the troops of Ibrahim Pasha; it has since been rebuilt. —Pop. about 10,000.

TRIPOS, n. *trī'pŏs* [Gr. *tripous*, three-footed (see TRIPOD)]: a three-legged stool; at *Cambridge Univ.*, England, one of the honor-lists with its three classes—the *tripos* now embrace mathematics, classics, law, theology, etc., ten departments in all; the honors examination. TRIPOS-PAPER, a printed list of the successful candidates for mathematical, classical, and other honors. TRIPOSES, n. plu. *trī'pŏs-ĕz*, the three divisions in the list of mathematical, classical, and other honors, the mathematical consisting of (1) Wranglers, (2) Senior Optimes, (3) Junior Optimes—the classical and others being divided into first class, second class, and third class.

TRIP'PANT: in *her.*, term analogous to Passant (q.v.), but applied to animals of chase.

TRIPTEROUS, a. *trĭp'tĕr-ŭs* [Gr. *treis*, three; *pteron*, a wing]: in *bot.*, three-winged, as a leaf.

TRIPTOTE, n. *trĭp'tōt* [Gr. *treis*, three; *ptōtos*, liable to fall]: in *gram.*, a noun used in only three cases.

TRIPTYCH, n. *trĭp'tĭk* [Gr. *treis*, three; *ptuchē*, a fold]: sacred pictorial representation, used generally as an altar-piece, consisting of three compartments, the centre one fixed, the other two (each about the half the width of the principal tablet) made to fold like doors on the centre one and cover it: a writing-tablet in three parts that can be folded into one. See DIPTYCH.

TRIQUETROUS, a. *trī-kwē'trŭs* [L. *triquetrus*, having three corners—from *tres*, three]: in *bot.*, having three angles, the faces being concave; in *anat.*, three-sided or three-cornered, as a bone. TRIQUE'TROUSLY, ad. *-lĭ*.

TRIREME, n. *trī'rēm* [F. *trirème*—from L. *trirēmis*, a trireme—from *tres*, three; *rēmus*, an oar]: a vessel with three benches or tiers of oars on each side; a galley having three banks of oars—said to have been employed first by the Corinthians in their war with Corcyra, B.C. 664. In the Persian and Peloponnesian wars, triremes were the largest vessels; but at the time of Alexander, galleys with four and five banks had gradually come into favor. In the Punic wars, the Carthaginians generally employed quinqueremes; and as the Roman triremes could have no chance against vessels with such high bulwarks, the Romans thenceforth constructed their war-vessels after the model of the Carthaginian quinquereme.

The banks of oars were elevated above each other, but not perpendicularly: and the lowest rank of rowers, having the shortest oars and easiest work, had least pay. The T. or the quinquereme was also provided with a square sail, which was used in voyaging when the wind was favorable, but not used in action. The crew numbered about 200; and on a smooth sea it was capable of considerable speed and accuracy of maneuvering. In earlier times, before the Persian war, and even later, victory depended more on the number and valor of the soldiers on board than on the skill of the seamen. Herodotus mentions that besides the crew there were 40 marines on each Ionian T.: the Athenians improved this system by decreasing the number

of fighting men and trusting more to skilful management of their vessels. In a fight, the aim of every trireme was not, as before, to grapple with its opponent, but to dash with the greatest momentum possible with its beak against the enemy's vessel, striking it amidship, or, at any rate, disabling his banks of oars on one side: hence, later, in the Peloponnesian wars, the number of marines in each ship was reduced to ten. This system of ram-fighting has come again to vogue. A contrivance, strengthening the prow of the trireme, and increasing its efficiency as a ram, gave the Syracusans their final victory over the Athenians in the harbor of Syracuse.

TRISAC"RAMENTA'RIAN: a name given to those Lutherans and other Protestants who maintained that the sacraments of Baptism, the Lord's Supper, and Penance were necessary to salvation. This opinion was held by some Lutherans at Leipsic, and was advocated in England in the *Institution of a Christian Man*, published in 1536.

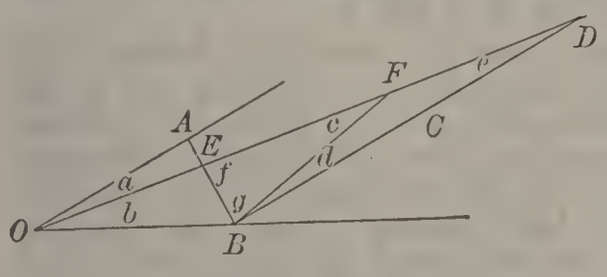
TRISAGION, n. *trĭs-ā'gĭ-ŏn* [Gr. *trisagĭŏs*, thrice holy —from *tris*, thrice; *hagĭŏs*, holy]: in the *Eastern Church*, the threefold invocation of the Deity as 'Holy, Holy, Holy;' one of the doxologies in use in the Greek Church, which is repeated in the form of versicle and responses by the choir in certain parts of the liturgy. The words of the Trisagion are: *'Hagios O Theos, Hagios Ischuros, Hagios Athanatos, eleison hemas!'* (O Holy God, O Holy Mighty One, O Holy Immortal, have mercy on us!). This doxology, in its original Greek form, is one of the few fragments of the Greek liturgy which (like the *Kyrie Eleison*) are retained in the original language in the Roman mass. It occurs in the service of Good Friday in the procession and veneration of the cross (see GOOD FRIDAY). The name Thisagion is sometimes incorrectly given to the Sanctus.

TRISE, v. *trīz:* among *seamen*, to haul up by means of a rope. TRI'SING, imp. TRISED, pp. *trīzd*. Same as TRICE 2, which see.

TRISECT, v. *trī-sĕkt'* [L. *tres*, three; *sectus*, pp. of *secārĕ*, to cut]: to cut or divide into three equal parts. TRISECT'ING, imp. TRISECT'ED, pp. TRISEC'TION, n. *-sĕk'-shŭn*, the division of a thing into three equal parts; in *geom.*, the division of an angle into three equal parts.

TRISECTION OF AN ANGLE: The problem of the trisection of an angle originated with Greek geometers of the 5th c., B.C. It is one of three famous problems which are known now to be incapable of solution, but which greatly stimulated the study of elementary geometry through the attempts at their solution made by hundreds of mathematicians. The other two problems relate to the quadrature of the circle and the duplication of the cube. The construction in each problem was to be effected with the aid only of an ungraduated ruler and a pair of

compasses. In other words, the ruler could not be used as a sect-carrier and the figure could contain merely straight lines and circles. The problem is 'impossible' in the sense that no general method exists of trisecting *any* given angle by the aid of the instruments named. Any number of special angles, such as those of 90°, 45°, 180°, can be trisected, while any number of other angles, such as those of 120°, 60°, 30°, $\cos^1 \frac{1}{6}$, $\cos^1 \frac{m}{n}$ (where m and n are integers having no common factor and n is divisible by a prime number p, but not by p^2) cannot be trisected. (Consult Cajori, *Theory of Equations,* 1904, p. 208). That no construction existed for the trisection of any given angle was suspected to be the case ever since the time of Vieta, Descartes and Fermat. A rigorous algebraic proof of the impossibility of trisection was given in 1837 by L. Wantzel (*Liouville Jour.* Vol. ii., p. 366). For a recent proof, see Klein, *Famous Problems in Elementary Geometry* (ed. Beman and Smith, 1897, chapter II). It was shown by the Greeks that the trisection could be effected by the use of transcendental or high curves, instead of the circle, but this procedure was considered by them mechanical, not geometrical. They accomplished the construction by a curve known as the quadratrix and by the conchoid of Nicomedes. Many other curves answer the same purpose. Numerous approximate solutions with ruler and compasses are known, and many mechanical contrivances for trisection exist. For the bibliography, see Max Simon, *Elementar. Geometrie im XIX. Jahrhundert* (1906, pp. 82-87). A simple accurate construction by the use of a ruler and compasses only can be effected, if we permit ourselves to depart from the limitations set by the Greeks to the extent of marking the ruler, so it can be used as a sect-carrier. Draw AB ⊥ OA and BC || OA. Mark on the ruler the length 20B, then turn the ruler around the point O until the intercept ED between the lines AB and BC equals 20B. Then angle a is one-third of the given angle AOB, and the trisection is accomplished. Proof: Draw BF so that d = e, then c = d + e = 2e = 2a; g = f, being complements of equal angles. Hence EF = BF = FD = OB. Then c = b and b = 2a.



TRISEPALOUS, a. *trī-sĕp'a-lŭs* [L. *tres,* three, and Eng. *sepal*]: in *bot.,* having three sepals.

TRISEPTATE, a. *trī-sĕp'tāt* [L. *tres,* three; *sepius,* pp. of *sepĭō,* I fence in]: having three partitions or septa in an ovary or fruit.

TRISMEGISTUS, *trĭs-mē-jĭs'tŭs* [Gr., Thrice-greatest]: epithet applied to the Egyptian Hermes (q.v.) or Thoth (q.v.) by the Neo-Platonists and the devotees of magic, alchemy, and mysticism generally, who deemed him the source of all mysterious doctrines: see HERMETIC BOOKS.

TRISMUS, n. *trĭz'mŭs* [Gr. *trizō*, I gnash]: lock-jaw; a kind of tetanus affecting the muscles of the jaw. TRIS'MUS NASCEN'TIUM, a form of lock-jaw occurring in newly-born children, caused mainly by impure atmosphere: see LOCK-JAW. In Iceland this disease annually carries off a large proportion of infants between the 5th and 12th days after birth. It is very frequent and fatal also in the W. Indies, where it is known as the 'ninth-day disease.' Another of its names is 'the jaw-fall,' from the jaw relaxing and dropping on the breast shortly before death. The disease, formerly common in hospitals, has become rare with the introduction of better ventilation. For treatment, immediate removal to a pure air, a warm bath, and a dose of castor-oil should be tried.

TRISOCTAHEDRON, n. *trĭs-ŏk'tă-hē'drŏn* [Gr. *tris*, thrice; *oktō;* eight; *hedra*, a base]: a figure having twenty-four equal faces.

TRISSINO, GIOVANNI GIORGIO: Italian author: b. Vicenza 1478; d. Rome 1550. He studied the Greek language under Chalcondylas, and became also a graceful Latin and Italian writer. At a mature age he was employed by Popes Leo X. and Clement VII. upon several diplomatic missions. He wrote *Sofonisba*, the first Italian regular tragedy; *L'Italia liberata dai Goti*, an epic in blank verse; and *La poetica*, a treatise on poetical art. To his suggestion is attributed the present method of writing the v and j of the Roman alphabet different from the u and i with which they were before confounded. He also endeavored to introduce distinct signs for the different sounds of o and e.

TRIST, NICHOLAS PHILIP: American lawyer and diplomatist: b. Charlottesville, Va., 1800; d. 1874. He studied at West Point, but left the Military Academy without graduating; studied law with Thomas Jefferson; in 1824 took a clerkship in the United States treasury department; and in 1829 became private secretary to President Jackson. He was consul at Havana in 1834-6, and in 1845 was made chief clerk in the department of state. In 1847, April 15, President Polk appointed him special agent to negotiate a peace with Mexico, American successes having practically determined the result of the war with that country. (See MEXICAN WAR.) A quarrel with General Scott hindered the performance of his mission, and his efforts were unavailing until the new government succeeded that of Santa Anna. Meanwhile Trist's commission had been canceled; but having become reconciled with Scott, he followed his counsel

and continued the negotiations, which resulted in the treaty of Guadalupe-Hidalgo.

TRISTAN DA CUNHA, *trĭs-tân' dâ-kôn'yâ:* group of three islands and two small islets, belonging to Great Britain, in the s. Atlantic, midway between the coast of S. America and the Cape of Good Hope; 37° 5′ 50″ s. lat. The largest island, Tristan, is about 20 m. in circumference, having in the centre a volcanic cone 7,640 ft. high. Several sailors have resided on these islands for a longer or shorter time. one company on Tristan, left by a British expedition 1817, numbered (1886) 97 persons. Inaccessible Island, 20 m. from Tristan, harbored two Germans for two years, who had a kind of Robinson Crusoe experience; but were glad of opportunity to leave by the British ship *Challenger* 1873. Nightingale Island, 10 m. from Tristan, is the smallest of the three.

TRISTE, or TRIST, a. *trēst* or *trĭst* [F. *triste*—from L. *tristis,* sad]: sad, unhappy. TRIST'FUL, a. *-fûl,* in *OE.,* sad; melancholy; gloomy.

TRISTEARIN, n. *trī-stē'ă-rĭn* [see STEARIN]: the fatty body forming the greater part of mutton-fat; also called GLYCERYL TRISTERATE.

TRISTICHOUS, a. *trĭs'tĭ-kŭs* [Gr. *treis,* three; *stichos,* a row]: in *bot.,* arranged in three vertical rows.

TRISTRAM, *trĭs'tram:* hero of a British legend, originally unconnected with King Arthur and the Round Table, though later minstrels have sought to interweave them.

Tristram having in infancy lost both parents, is brought up for the first fifteen years of his life at the court of the monarch who had slain his father, after which he proceeds to Cornwall, and is acknowledged by his uncle Mark, King of Cornwall, who appoints him his heir and successor. Having received a severe wound in a duel, he is cured by Ysolt or Ysonde, daughter of the queen of Ireland; and on his return to Cornwall informs his uncle of the marvelous beauty of the Irish princess. Mark sends his nephew to Dublin to solicit her hand in marriage. The king's suit is successful, and Tristram escorts her to England; but, both having unwittingly partaken of a love-potion (intended for Mark), they are immediately inflamed with a criminal passion for each other. Ysolt marries the king; but, by help of her maid, Brenqwain, she has secret interviews with her lover, and for some years succeeds in allaying the suspicions of her husband. At last, however, Tristram is banished; but his uncle, becoming reconciled to him, invites him back to court, where the amours of the lovers are renewed. Banished a second time, Tristram goes abroad; in Brittany he marries another Ysolt, called, for distinction, Ysolt *with the white hand,* daughter of the Duke of Brittany. In one of his exploits, he is desperate-

ly wounded, and can be cured only by Ysolt of Cornwall. A messenger was dispatched for her, with instructions to hoist a white sail if she accompanied him on his return; but if not, a black sail. As the vessel nears the shores of France, Tristram's wife, Ysolt *with the white hand,* recognizes the white sail, and, jealous at the thought of a rival's approach, hurries to her husband's chamber, and tells him the messenger comes with black sails spread. Tristram, in an agony of disappointed love, sinks back and expires. When the queen lands, and hears of his death, she rushes to the castle, throws herself on his corpse, and dies beside him. King Mark, learning the story of the love-potion, buries them in one grave, planting over Ysolt a rose-bush, and over Tristram a vine, which grew up so inextricably intertwined that no man could ever separate them.

The popularity of the story in the middle ages was unbounded. Sir Walter Scott's metrical version of *Sir Tristram* (1806) is from the Auchinleck MS., considered to be the composition of Thomas the Rymour (q.v.). As early as the middle of the 12th c., the legend had become a favorite throughout France; and subsequently found its way into Spanish, Italian, German, Scandinavian, Slavic, and Greek literature. *Tristan und Isolde* is the subject of one of Wagner's operas.—See Michel's *Tristan* (1835), and Bossat's (1865).

TRISYLLABLE, n. *trĭs-sĭl'lă-bl* [Gr. *treis,* three; *sullabē,* a syllable (see SYLLABLE)]: a word consisting of three syllables. TRISYLLABIC, a. *trĭs'ĭl-lăb'ĭk,* or TRIS'YLLAB'ICAL, a. *-lăb'ĭ-kăl,* consisting of three syllables; pertaining to a trisyllable: see note under DISSYLLABLE.

TRITE, a. *trīt* [L. *trītus,* pp. of *terĕrĕ,* to rub: It. *trito,* trite: Russ. *terete,* to rub]: worn out; hackneyed; common; stale; so common as to have lost all novelty and interest. TRITE'LY, ad. *-lĭ,* in a common manner. TRITE'NESS, n. *-nĕs,* the quality of being trite; staleness.

TRITERNATE, a. *trī-tĕr'nāt* [L. *tres,* three; *terni,* three each]: in *bot.,* divided three times in a ternate manner.

TRITHEISM, n. *trī'thē-ĭzm* [Gr. *treis,* three, and Eng. *theism*]: the opinion or doctrine that the Father, Son, and Holy Spirit are three distinct Gods. TRI'THEIST, n. *-ĭst,* one who maintains tritheism. TRI'THEIS'TIC, a. *-ĭs'tĭk,* or TRI'THEIS'TICAL, a. *-ĭs'tĭ-kăl,* pertaining to tritheism.

TRITHING. See TRIDING.

TRIT'ICUM. See WHEAT; COUCH GRASS.

TRITON, n. *trī'tŏn* [L. and Gr. *Trītōn*]: a fabled sea-god, the son of Neptune, and Amphitrite, and trumpeter of Neptune; represented as having the upper part of the body like that of a man, and the lower like that of a fish. He dwells with his parents in a golden palace at

the bottom of the sea, and usually figures as attendant on his father, riding over the Mediterranean on a horse or other sea-monster, soothing the turbulent waves by blowing his shell-trumpet—his 'wreathed horn,' as Wordsworth calls it. The later poets speak of Tritons, in the plural, as a race of subordinate sea-deities, described by Pausanias as having sea-green hair and eyes, gills below the ears, human noses, broad mouths with the teeth of animals, scales on their bodies, and a tail like that of a dolphin.

TRITON, *trī'ton:* genus of aquatic Salamandridæ belonging to the e. hemisphere. In some classifications allied Amer. genera are called tritons. Thus, *Spelerpes,* of family *Plethodontidæ,* has been classed as Triton. The European Triton, or Crested Newt, is *Triton cristatus.*

TRITOZOOID, n. *trĭt'ō-zō'oyd* [Gr. *trĭtŏs,* third; *zōŏn,* an animal; *eidos,* resemblance]: in *zool.,* a zooid of the third generation.

TRITURATE, v. *trĭt'ū-rāt* [L. *trītūra,* a rubbing, chafing—from *trītus,* pp. of *terĕrĕ,* to rub]: to rub or grind to a fine powder, TRIT'URATING, imp. TRIT'URATED, pp. TRIT'URA'TION, n. *-rā'shŭn,* the act of reducing to a fine powder. TRIT'URABLE, a. *-rā'bl,* capable of being reduced to a fine powder by rubbing or grinding.

TRIT'YL. See PROPYL.

TRIUMPH, n. *trī'ŭmf* [L. *triumphus,* a solemn and magnificent entrance of a general into anc. Rome after having obtained an important victory; Gr. *thriambos,* a procession in honor of Bacchus: F. *triomphe*]: the pomp with which a victory was celebrated in public by the anc. Romans; a victory; a conquest; state of being victorious; exultation for success: V. to celebrate a victory with pomp; to obtain victory; to exult in consequence of an advantage gained; to be prosperous. TRI'UMPHING, imp. N. the act of one who triumphs. TRI'UMPHED, pp. *-ŭmft.* TRI'UMPHER, n. *-ŭmf-ėr,* one who triumphs. TRIUM'PHAL, a. *-făl,* pert. to a triumph; serving to commemorate a victory; serving to betoken joy, or to give a joyful welcome. TRIUM'PHANT, a. *-fănt,* celebrating victory; rejoicing, as for victory; expressing joy for success; victorious. TRIUM-PHANTLY, ad. *-lĭ,* victoriously; with success. TO TRIUMPH OVER, to overcome; to subdue. TRIUMPHAL ARCH, an arch erected to perpetuate the memory of a conqueror, or some remarkable victory or important event; a temporary erection in the form of an arch as a mark of rejoicing.—*Triumph,* the public honor bestowed in ancient Rome on a general successful in war, consisted in a solemn procession along the *Via Sacra* up to the Capitol, where sacrifice was offered to Jupiter. The victor sat in a chariot drawn by four horses—his captives marching before, his troops behind. Certain conditions had to be fulfilled before a triumph could be

granted, and it was the business of the senate to see that these were enforced. Under the empire, generals serving abroad were considered the emperor's lieutenants; therefore, however successful in their wars, they had no claim to a triumph, but received instead *triumphal decorations* and other rewards.

The appearance of Rome on the occasion of a triumph, especially in later times, was joyous in the extreme. All work was suspended; the temples were thrown open, and decorated with flowers; the populace, clad in holiday attire, crowded the steps of public buildings in the *Via Sacra,* and the forum, or mounted the scaffolding erected to give view of the procession; banquets were spread before every door. As for the *imperator* (commander—see EMPEROR) himself, after having pronounced a eulogy on the bravery of his soldiers, he ascended his triumphal car, entered the city by the *porta triumphalis,* where he was met by the senate, and the procession began. The senate, headed by the magistrates, marched first; next a body of trumpeters; then a train of carriages and frames laden with the spoils; then a body of flute-players, followed by the oxen to be sacrificed, and the sacrificing priests, etc.; then the distinguished captives with bands of inferior prisoners in chains; after whom walked the lictors of the imperator, having the fasces wreathed with laurel. Next came the hero of the day—the imperator, in a circular chariot, attired in an embroidered robe (*toga picta*) and flowered tunic (*tunica palmata*), bearing in his right hand a laurel bough, in his left a sceptre, and having his brows garlanded with Delphic laurel. He was accompanied by his children and his intimate friends. His grown-up sons, and the legates, tribunes, and equites, rode behind; the rear being brought up by the rest of the soldiery, singing or jesting at their pleasure, for it was a day of carnival and license. When the procession had reached the Capitoline, some of the captive chiefs were taken aside and put to death; the oxen were then sacrificed, and the laurel wreath placed in the lap of Jupiter. In the evening the imperator was publicly feasted; and it was customary to provide him a site for a house at the public expense.

The *ovation,* or lesser triumph, granted for a great success which yet did not fulfil the specified conditions for a triumph, differed from the greater chiefly in these respects: that the imperator entered the city on foot, clad in the simple *toga prætexta* of a magistrate; that he bore no sceptre, was not preceded by the senate and a flourish of trumpets, nor followed by his victorious troops, but only by the equites and the populace; and that the ceremonies were concluded by sacrificing a sheep instead of a bull, whence, doubtless, the name *ovation* [from *ovis,* a sheep].

TRIUMVIR, n. *trī-ŭm′vėr* [L. *tres,* three; *trium,* of three; *vir,* a man]: one of three men united in the same

office; plu. TRIUM'VIRS, *-vĕrz,* or TRIUM'VIRI, *-vĭ-rī.* TRIUM'VIRATE, n. *-vĭ-rāt,* a company of three; in *anc. Rome,* one of several groups or companies of three men jointly charged with some municipal or state business, such as the *triumviri capitales,* who took cognizance of murders and robberies; *triumviri nocturni,* who watched over the safety of Rome in the night-time; *triumviri monetales,* or masters of the mint: specifically, in *Roman hist.*—(1) the coalition or private league by which Pompey, Crassus, and Cæsar—the three most powerful men of their time—sought to carry out their own schemes of political aggrandizement, in spite of the opposition of the senate. This compact was not a triumvirate in the proper sense of the term: it had no legally constituted existence: it was, in fact, only a conspiracy of three men against the authority of the state. (2) The division of government between Octavian (Augustus), Mark Antony, and Lepidus, in the civil wars that followed the murder of Cæsar—an arrangement sanctioned by the senate. The former is usually called the *first,* the latter the *second,* triumvirate.

TRIUNE, a. *trī'ūn* [L. *tres,* three; *unus,* one]: three in one—applied to God, in order to express the unity of the Godhead in a trinity of persons. TRIU'NITY, n. *-ū'nĭ-tĭ,* state of being triune; the Trinity.

TRIVALENT, a. *trĭv'a-lĕnt* [prefix *tri;* L. *valens, valentis,* powerful]: in *chem.,* equivalent to three units of any standard, especially to three atoms of hydrogen.

TRIVANDRUM, TRIVANDRAM, or TIRUVANANTAPURAM, India: the capital of the native state of Travancore, situated on the west coast near the southern extremity of India. It has a college and a fine modern palace of the raja, and on the outskirts are a fort, a military cantonment and an observatory. It is connected by a canal with the port of Quillon. Pop. 578,882.

TRIVET. See TREVET.

TRIVIAL, a. *trĭv'ĭ-văl* [F. *trivial*—from L. *trivĭālis,* that may be found everywhere, ordinary—from *trivĭum,* a cross-road—from *tres,* three; *via,* a road or way]: such as may be found everywhere; hence, commonplace; of little worth or importance; trifling; inconsiderable; slight; vulgar. TRIVIALITY, n. *trĭv-ĭ-ăl'ĭ-tĭ,* the state of being trivial; anything of little worth; a trifle. TRIV'IALLY, ad. *-lĭ.* TRIV'IALNESS, n. *-nĕs,* lightness; unimportance. TRIV'IUM, n. *-ŭm* [L.]: a name given in the middle ages to the three arts of grammar, logic, and rhetoric, constituting, as it were, a *triple way* to eloquence. TRIVIAL NAMES, the names added to the names of genera, which double or binomial names constitute the names of species, as *Tritĭcum* is the generic name of certain cereals, while *Tritĭcum vulgārĕ* is the specific name of one of the genus—viz., common wheat; same as SPECIFIC NAME, which see under SPECIFY.

TRIV'IUM: the name given in the Middle Ages to the first three of the seven liberal arts—grammar, rhetoric, and logic. The other four, consisting of arithmetic, music, geometry, and astronomy, were called the *quadrivium.*

TRI-WEEKLY, a. *trī'wēk-lĭ* [*tri,* and Eng. *weekly*]: occurring or appearing once every three weeks (less correctly, thrice a week), as a *tri-weekly* newspaper.

TROAD, *trō'ad,* THE: the land of ancient Troy (q.v.), bounded n. by the Hellespont, and part of the Propontes; w. by the Ægean Sea; s. by the Gulf of Adramyttium; e. by the mountain range of Ida, at whose base stood the city of Troy: see TROY (ancient).

TROCAR, or TROCHAR, n. *trō'kâr* [F. *trocar*—from *trois,* three; *carre,* an angle—from L. *quadra,* a square—so called from its triangular point]: a surgical instr. for puncturing a cavity for the purpose of letting out the fluid it contains; it carries with it a tube (the cannular) which is left in situ when the trocar is withdrawn, and through which the fluid escapes.

TROCHAIC, or TROCHAICAL: see under TROCHEE.

TROCHAL, a. *trō'kăl* [Gr. *trŏchŏs,* a wheel—from *trechein,* to run]: wheel-shaped.

TROCHANTER, n. *trō-kăn'tėr* [Gr. *trochantēr,* a runner, the ball on which the hip-bone turns in its socket—from *trochazein,* to run along—from *trechein,* to run]: in *anat.,* one of the two processes or prominences at the upper part of the thigh-bone, called the *greater* and the *less,* in which are inserted several of the muscles used in motion. TROCHANTER'IC, a. *-tĕr'ĭk,* of or pertaining to the trochanters.

TROCHAR. See TROCAR.

TROCHEE, n. *trō'kē,* or TROCHÆUS, n. *trō-kē'ŭs* [L. *trochæus;* Gr. *trochaios,* a trochee—from *trochos,* a running; *trechein,* to run]: a metrical foot of two syllables, a long followed by a short. TROCHAIC, a. *trō-kā'ĭk,* or TROCHA'ICAL, a. *-ĭ-kăl,* consisting of trochees.

TROCHELMIN'THES: a phylum of the animal kingdom, containing a comparatively small number of minute aquatic organisms, characterized by having that larval form denominated a trochophore (see LARVA). It is principally composed of a single class, the *Rotifera,* plus two other groups of microscopic and little known marine 'worms,' the *Dinophilea* and the *Gastrotricha.*

TROCHIDÆ, *trō'kĭ-dē:* family of gasteropodous mollusks, of order *Pectinibranchiata,* section *Asiphonata.* The shell has the aperture entire, closed with an operculum; spiral, and very generally top-shaped, as in the genus *Trochus,* the species of which are popularly known as Top-shells. The species are very numerous, and widely distributed. They feed on sea-weeds, and some

are found on rocks between high and low water mark. Many are very beautiful, and some small kinds, strung together, are often employed by South Sea islanders for ornamental purposes, the epidermis and outer layer being removed, exposing the pearly substance of the shell. Some of the tropical ones attain large size. The trochidæ are closely allied to *Turbinidæ*.

TROCHILICS, n. plu. *trō-kĭl'ĭks* [Gr. *trochilĭa*, a roller, a windlass; *trochos*, a wheel—from *trechein*, to run]: in *mech.*, the science of rotary motion. TROCHIL'IC, a. *-ĭk*, having power to draw out or turn round, as a wheel; pertaining to rotary motion.

TROCHILUS, *trŏk'ĭ-lŭs*, AND TROCHILIDÆ, *trō-kĭl'ĭ-dē*. See HUMMING-BIRD.

TROCHLEA, n. *trŏk'lĕ-ă* [L. *trochlĕa*, a case containing one or more pulleys—from Gr. *trochos*, a wheel; *trechein*, to run]: in *anat.*, a pulley-like cartilage over which a tendon passes; one of the projections of bones over which parts turn as ropes over pulleys. TROCH'LEAR, a. *-lĕ-ér*, shaped like a pulley. TROCH'LEARY, a. *-ér-ĭ*, of or pertaining to the trochlea.

TROCHOID, n. *trō'koyd* [Gr. *trŏchŏs*, a wheel; *eidos*, resemblance]: in *geom.*, the curve described by any point in a wheel rolling on a straight line. ADJ. conical with a flat base, as the shells of certain Foraminifera. TROCHOID'AL, a. *-koyd'ăl*, pertaining to a trochoid; in *anat.*, applied to the rotary motion of one bone upon another.

TROCHU, *tro-shü'*, LOUIS JULES: French soldier: b. Palais, Morbihan, France, 1815, Mar. 12; d. Tours, 1896, Oct. 7. He was educated at the St. Cyr Military School; entered the army at an early age and in 1840 was attached to the general staff with the rank of lieutenant. Sent to Algeria in 1846; he was made adjutant to Marshal Buglaud and after some years of service in the ministry of war, acted in the same capacity with Marshals Canrobert and Saint Arnand in the Crimea, gaining special distinction in the storming of the Malakoff bastion at Sebastopol. He fought against Austria in 1859, doing excellent service at Solferino, where he held the rank of general of division. Once more in the ministry of war and in favor with the government, he made himself *persona non grata* by the publication of his *L'Amée françoise en 1867*, in which the deplorable conditions prevailing in the army were ruthlessly pointed out and a reorganization of the national forces on the German model was urged. After the outbreak of war with Germany he was made governor of Paris, but placed himself in opposition to the empire, and after the proclamation of the republic, Sep. 4, became president of the government of national defense, retaining at the same time his office of governor of the capital. In his defense of the city against the besieging German army he dis-

played a half-heartedness which his enemies ascribed to timidity, but which was probably due to his conviction of the hopelessness of resistance. He resigned the governorship a few days before the capitulation of the city, but remained at the head of the provisional government till the meeting of the National Assembly. In his defense he published *L'empire et la défense de Paris devant le jury de la Seine* (1872); *Pour le vérité et pour la justice* (1873); *La politique et le siège de Paris* (1874).

TROD, pt. *trŏd;* TROD, or TRODDEN, pp. *trŏd'n.* See under TREAD.

TROGLODYTE, n. *trŏg'lō-dīt* [Gr. *trōglodutēs,* one who creeps into holes—from *trōglē,* a hole, a cavern; *duein,* to enter]: one dwelling in a cave; a cave-dweller; specifically, in *hist.,* a member of certain races or tribes of uncivilized men who lived in natural caverns or in holes which they had dug for themselves in the earth; hence, one who lives so secluded a life as to be ignorant of current events. TROG'LODYT'IC, a. *-dĭt'ĭk,* or TROG'LODYT'ICAL, a. *-dĭt'ĭ-kăl,* pert. to a troglodyte or dweller in caves.—*Troglodytes* are mentioned by Strabo as existing in Mauritania and the Caucasus; but perhaps the best-known troglodytes were those of s. Egypt and Ethiopia, where a considerable district was called *Regio Troglodytica.* They could not speak articulately, but shrieked or screamed like the lower animals: the Greeks, however, are not very trustworthy authorities in the matter of language—accounting every dialect which they did not understand a barbarous jargon. The chief occupation of the troglodytes was herding cattle, though we read that they were also hunters and robbers. They are mentioned also as serving among the light troops in the army of Xerxes. Their habits of life were rude and debased; they are reported to have eaten the bones and hides as well as the flesh of their cattle; their drink was a mixture of milk and blood; and they had a community of wives. The women tattooed their bodies; the men wore skins or went unclothed. Their treatment of the dead was very revolting: they bound the corpse neck and heels together, fixed it to a stake, pelted it with stones, amid shouts of laughter, and then buried it beneath a cairn, placing a horn on the top.

What measure of truth there may be in the stories about the troglodytes, it is now impossible to say; but archæological investigations have led to the conclusion that a race of cave-dwellers preceded in most countries the races that lived in houses built on the ground; and perhaps we shall not be far wrong if we regard Troglodytism as the primitive state of mankind in very many countries.

TROGONIDÆ, *trō-gŏn'ĭ-dē:* family of birds, ranked by some naturalists, on account of their habits, in order *Insessores* and tribe *Fissirostres:* but more generally, on account of the formation of the feet—two toes before and

two behind—placed in the order *Scansores*. The trogonidæ are remarkable for beauty of plumage, which is soft, and brightly colored. The bill is short, with a wide gape; tail generally long; feet are small. All the Trogonidæ are tropical; they belong chiefly to s.e. Asia, the Indian Archipelago, and S. America. They inhabit forests, where they sit motionless on branches, waiting for insect prey, darting on insects as they fly past. They make their nests in the hollows of decayed trees. Their flesh is esteemed for flavor. They are all of small size. In brilliancy of plumage, some are excelled only by humming birds. The Imperial Trogonidæ (*Calurus resplendens*), the Quesal of Central America, is the extreme of beauty; brilliant metallic green in color, the effect heightened by separated feather-filaments like floss, and the tail-coverts forming a long plumy train.

TROIC, a. *trō'ĭk* [L. *Troicus*]: of or pertaining to ancient Troy or the Troas; Trojan.

TROJAN, n. *trō'jăn:* an inhabitant of anc. Troy; *familiarly*, a courageous fellow: ADJ. *pert.* to anc. Troy (q.v.).

TROLL, v. *trōl* [Ger. *trollen*, to roll, to troll: Low Ger. *drulen*, to roll: Swiss, *trohlen*, to thunder, to roll: Norw. *trulla*, to trundle: Low Ger. *trül*, anything of a rounded form: W. *trolio*, to trundle, to roll]: to roll or trundle; to move or utter volubly; to turn; to drive about; to sing the parts of in succession, as of a round; to draw on; to fish with a rod having the line running on a reel near the handle: N. a reel at the handle of a fishing-rod round which the line is rolled; a song the parts of which are sung in succession. TROLL'ING, imp.: ADJ. rolling; driving about; fishing with a rod and reel; more particularly, fishing by dragging a long line with a hook and fly behind a boat which is pulled or sailed at a brisk pace, as in *trolling* for mackerel. TROLLED, pp. *trōld*. TROLL'ER, n. *-ėr*, one who trolls. TO TROLL or TROWL THE BOWL, to push the bowl round. TROLLEY, or TROLLY, n. *trŏl'lĭ*, a kind of truck which can be tilted over by removing pins which attach it to the frame, and used for running on tracks, as with railway materials, etc.; a large, flat, heavy cart without sides. TROLLEY, n. grooved metal wheel for rolling in contact with an electric conductor overhead or underground (the trolley-wire), to convey the current to a motor-car. Colloq. the troll system; a road operated on that system; or a car pertaining to such a road.

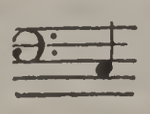
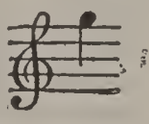
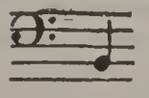
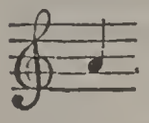
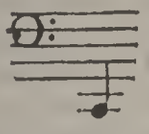
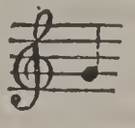
TROLL, n. *trŏl* [Icel. *troll;* Dan. *trold*, a hobgoblin]: in *Scand. myth.*, a supernatural being superior to man in strength and stature, but much beneath him in mind; in the folk-lore of Iceland, one of a race of giants; in later Norse story, a diminutive sprite, inhabiting gorgeous apartments in the interior of hills. In modern Denmark the term is indiscriminately applied to all hobgoblins, imps and spirits of the *brownie* type.

TROLLOP, n. *trŏl'lŏp* [from Eng. *troll*, to roll or trundle: Scot. *trollop*, to hang in a wet state]: a strolling loitering woman; a woman loosely and negligently dressed; a draggle-tail; a drab.

TROLLOPE, *trŏl'ŭp*, ANTHONY: English novelist: 1815, Apr. 24—1882, Dec. 6; b. London; second son of Mrs. Frances Trollope. He was educated at Winchester and Harrow. While filling a responsible official situation in the post-office, he found or made leisure to amuse the public with a long series of novels, of remarkable merit. The first work which attracted attention, *The Warden*, 1855, was followed by a continuation, *Barchester Towers*, which is perhaps the cleverest of all his books. In rapid succession came *Doctor Thorne*, *The Bertrams*, *The Three Clerks*, *Castle Richmond*, *Framley Parsonage* (originally pub. in the *Cornhill Magazine*), *The Kellys and the O'Kellys*, *Orley Farm*, *The Small House at Allington* (contributed to the *Cornhill Magazine*), *Rachel Ray*, *Miss Mackenzie*, *Can You Forgive Her? Ralph the Heir*, *The Golden Lion of Granpere*, *Ayala's Angel* (1881). Besides these, T. published volumes on *The West Indies and the Spanish Main*, on *North America* (1862), on *Australia* (1873), and on *South Africa* (1878), a Life of *Cicero* (1881), and sketches of *Thackeray* (1879) and *Palmerston* (1882). His *Autobiography* appeared 1883. T. sketches the superficial aspects of society with a charming lightness, and his works are unfailingly agreeable and amusing.

His elder brother, THOMAS ADOLPHUS T., has lived for many years at Florence, and is favorably known by his *Girlhood of Catherine de Medici; A Decade of Italian Women;* and a number of novels such as *La Beata; Marietta; Lindisfarn Chase; Gemma; The Garstangs; The Dream Numbers.* He has written a *History of Florence* and *Life of Pius IX.*

TROL'LOPE, FRANCES (MILTON): novelist and miscellaneous writer: 1780–1863, Oct. 6: b. Heckfield, Hampshire, England; daughter of an English clergyman. In 1809 she was married to Anthony T., barrister at-law. In 1829 she came to the United States, where, during a 3 years' residence (in Cincinnati, O.), she amassed the materials of her first book, *Domestic Life of the Americans*, 1832, which attracted great attention, and revealed the American sensitiveness of that period by the indignation which it caused: it would now excite rather amusement. From this time, the literary activity of Mrs. T. was uninterrupted, and her name became notable. Novels of society and impressions of travel make up the sum of her works. Of her novels the most successful is, perhaps, *The Widow Barnaby* (3 vols. 1839), with its sequel, *The Widow Married* (3 vols. 1840); followed by *The Barnabys in America, or Adventures of the Widow Married.* Mrs. T. was a woman of talent, and her works show shrewd observation and true (though at times somewhat coarse) humor. They were popular in their day, but are now almost forgotten. During her later years much of her time was passed in Italy, where her eldest son, Thomas Adolphus T., had made his abode. She died at Florence.

TROMBONE, n. *trŏm'bōn* [It. *trombone*—from *tromba*, a trumpet (see TRUMPET)]: large deep-toned brass instrument, of the trumpet species, consisting of two separate parts, so constructed that the two ends of one fit into those of the other, and consequently, by sliding one part in or out, the tube through which the air passes may be shortened or lengthened, and the pitch changed at pleasure. Three kinds of T. are in general use, differing in pitch: the *Alto Trombone*, with a compass from  to  ; the *Tenor Trombone*, with a compass from  to  ; and the *Bass Trombone*, with a compass from  to  . The music for these instruments is written on the alto, tenor, and bass clefs respectively. There is also a *double-bass* T., rarely used. The T. judiciously employed, is very effective in an orchestra—the tone being grander and more powerful than that of the trumpet.

TROMOMETER, n. *trŏ-mŏm'ĕ-tĕr* [Gr. *tromos*, a trembling; *metron*, a measure]: an instrument for measuring earth-tremors, usually by observation of the motion of pendulums.

TROMP, *trŏmp*, CORNELIS VAN: Dutch admiral: 1629, Sep. 9—1691, May 29; b. Rotterdam; son of MARTIN HARPERTZOON T. (q.v.). He became vice-admiral at the age of 21 yrs., having already gained distinction in actions in the Mediterranean against corsairs and the English. When the Dutch fleet under Opdam was defeated off Solebay by the English, Van T. made a masterly retreat, 1665. He served again with distinction in the war of 1673. Afterward he commanded the navy of Denmark.

TROMP, *trŏmp*, MARTIN HARPERTZOON, *hâr'pĕrt-zōn:* famous Dutch admiral: 1597–1653, July 29; b. Briel, s. Holland. When a boy, he went to sea with his father, commander in the Dutch navy. In an engagement with an English cruiser off the coast of Guinea, his father was killed, and young T. made prisoner, and compelled to serve as cabin-boy for two years and a half. In 1622 he entered the navy and served as lieut. on a ship of the line, two years later receiving command of a frigate. In 1629 the famous Admiral Peter Heijn (q.v.) took command of T.'s ship, and was killed by his side. Disgusted by some real

or imaginary slight, T. retired about this time from the service. In 1637 he returned, was created lieut.-admiral, and appointed to command a squadron of 11 ships. He now prosecuted a vigorous naval war against the Spaniards, taking in one celebrated action, 1639, Oct. 21, 13 richly laden galleons. But the events which rendered his name famous occurred 1652–3, during hostilities between England and Holland. In 1652, May 19, he encountered the Eng. fleet under Blake (q.v.). The Dutch were defeated with the loss of two ships, and T. was for a while superseded by Ruyter and De Witt. He was soon afterward reinstated, and Nov. 29 again encountered Blake in the Strait of Dover, and was so successful that the English fleet was forced to retire; T. sailing up the Channel with a broom at his mast-head, to denote that he had swept his foes from the seas. Before long, however, the English returned, and, Monk and Deane having united with Blake, they attacked T. near Portland, 1653, Feb. 16, and defeated him, though only after a contest memorable for obstinacy. It lasted three days, at the close of which the English had taken or destroyed 11 ships of war and 30 merchantmen, killed 2,000 of the enemy, and captured 1,500. June 2 and 3 following, another battle took place, off North Foreland, 6 Dutch vessels being captured, 11 sunk, and the remainder driven into Calais roads. July 29 the warfare was again renewed off the coast of Holland, when the Dutch lost 30 men-of-war, and Admiral T. was killed.

T. was a thorough seaman, homely in manner, benevolent in disposition, and enthusiastic in his calling. He was buried at Delft with great pomp and solemnity.

TROMPE, or TROMP, n. *trŏmp* [F. *trompe;* It. *tromba*, a trumpet (see TRUMPET)]: furnace-blower; blowing apparatus used in the Catalan forge. Water is made to fall through a pipe that has side-openings through which air is sucked—thus producing a continuous air-current, which is conveyed to the forge. TROMP'IL, n. *-ĭl*, an aperture in a tromp.

TROMSÖE, *trŏm'sö-ĕh:* small island off the n.w. coast of Norway, in the amt or county of T., between Kvalö and the mainland; is 4 m. long, and about 1½ m. broad. On the e. side of the island is the small but thriving town of T., cap. of the amt, and seat of a bp. Russian vessels from Archangel and the White Sea bring corn, which they exchange for dried fish. The herring fishery is very productive, and there is some trade in bear-skins and furs. —Pop. of amt 75,000; of town 7,000.

TRON, n. *trŏn*, or TRONE, n. *trōn* [mid. L. *trona*, a steelyard—from L. *trutĭna;* Gr. *trutanē*, a balance: comp. Icel. *trana*, a crane· Gael. *trom*, heavy, weighty]: a steelyard-balance: specifically, in Scotland, a heavy beam or balance set up in the market-place, and employed in weighing heavy wares; hence, when applied to weights, T. means, of the standard employed in the public markets. The T. lb. contains 20 oz., but, from the custom of giving 'one in' to the score, was generally reckoned at 21 oz. But the value varied in different market-towns from 20 to 28 oz. The

later T. stone or standard weight contains 16 T. lbs., each lb. 16 T. oz., and each T. oz. 16 drops; the T. lb. is estimated to equal 1·3747 lbs. avoir. TRON CHURCH, the church in the market-place.

TRONA, n. *trō'nă* [of n. African origin]: a crude sesquicarbonate of soda, occurring in crystalline incrustations in the deserts of Africa and Asia, and in the dried-up lakes and river-courses of S. America, where it is called *urao*.

TROND'HJEM: see THRONDHJEM.

TROON, *trön:* important seaport, county of Ayr, Scotland; 8 m. s.w. of Kilmarnock, and 6 n. of Ayr. The greater part of the town (not older than the 19th c.) occupies a bare and level promontory; but along the strand of Ayr Bay stretches a row of handsome villas and cottages nearly half a m. long, occupied chiefly by summer visitors. The place is yearly becoming more attractive as a sea-coast residence, on account of its salubrity and splendid beach. The harbor occupies the extremity of the promontory, is secure and spacious, and much frequented. The principal exports are coal and iron, of which Ayrshire yields an abundant supply.—Pop. 4,700.

TROOP, n. *trôp* [Sp. *tropa;* F. *troupe;* It. *truppa*—from mid. L. *tropus*, a troop: perhaps from L. *turba*, a crowd: comp. W. *torp*, a round mass]: a number of persons in a body or line; a multitude; a division of a regiment of cavalry under a captain, two troops (of 60 troopers each) making a squadron; any band or company, as of actors: V. to collect in numbers; to march in a body or in company with some degree of haste. TROOP'ING, imp. TROOPED, pp. *trôpt.* TROOP'ER, n. *-ėr*, a horse-soldier. TROOPS, n. plu. *trôps*, soldiers in general; an army. TROOPSHIP, a ship for the conveyance of soldiers by sea. TROOPING THE COLORS, a ceremony performed at the public mounting of garrison guards. TROOPS OF THE LINE, all infantry regiments except the foot guards.

TROOPIAL, or TROUPIAL, *trô'pi-al:* name of various birds, rarely used, derived presumably from their associating in flocks or *troops*, and probably applied first to some birds of genus *Cassicus*, but used also for members of the family *Icteridæ*. It has sometimes been given to the cowbird of N. America. See COW-PEN BIRD.

TROOST, *trōst*, GERARD: naturalist: 1776, Mar. 15—1850, Aug. 14; b. Bois-le-Duc, Holland. He studied in the universities of Amsterdam and Leyden. Enabled by the munificence of King Louis Bonaparte to pursue nat. hist. studies in Paris, he there translated Humboldt's *Aspects of Nature* into Dutch. He settled in Philadelphia, Penn., 1810, and was one of the founders of the Acad. of Nat. Sciences there 1812; became prof. of mineralogy in the Philadelphia Museum, prof. of chemistry and mineralogy in Nashville (Tenn.) Univ. 1827, Tenn. state geologist 1830–49. He made the largest mineral and geological collections of his time in the United States.

TROPÆOLUM, n. *trō-pē'ŏ-lŭm* [Gr. *tropaion*, a trophy —in allusion to the resemblance of the leaves to bucklers or shields, and the flowers to helmets]: extensive genus of plants, mostly climbing, with orange-red or yellow flowers; nat. order *Tropæolaceæ*, and allied to *Balsaminaceæ* and *Geraniaceæ*. The species are not numerous, and all are natives of S. America. They are smooth herbaceous plants, somewhat succulent, with acrid or pungent taste, trailing or twining stems, and alternate simple or divided leaves, destitute of stipules. The species of the genus T. form the greatest part of the order, and have usually simple peltate leaves. *T. majus* is the well-known INDIAN CRESS, whose unripe fruit is often used to give pungency to pickles, under the very mistaken name *Nasturtium*—the Nasturtium being a genus of Water-cresses of a different family, *Cruciferæ*, and including the Horse-radish. The T. is a native of Peru, and has long been much cultivated in Britain as an ornamental plant, climbing among bushes or on trellises, and taking hold by the curving stalks of its leaves; its stems six to ten ft. long, foliage abundant; flowers large, orange, or dark red. The young leaves are used in salads. The Indian cress is really a perennial, though it flowers a few months after sowing, and in Britain is always treated as an annual, not enduring the winter. *T. minus* is very similar, but of weaker growth, and its flowers are smaller. *T. peregrinum*, though much more recently introduced than the Indian cress, has become almost as common, and is a great favorite in window-gardens: it is popularly called the CANARY PLANT. Its stems are long and slender, and it speedily covers a high trellis. Several other species are frequent and fine ornaments of gardens and greenhouses. The tubers of *T. tuberosum* are eaten in Peru: their taste is peculiar.

TROPE, n. *trōp* [F. *trope*—from L. *tropus;* Gr. *tropos*, a trope—from *trepō*, I turn: It. *tropo*]: in *rhet.*, a change in the signification of a word from a primary to a derived sense; a word or expression used in a sense different from that which it usually signifies; a word used figuratively. TROPICAL, a. *trō'pĭ-kăl*, figurative, as the use of a word. TRO'PICALLY, ad. *-lĭ*. TRO'PIST, n. *-pĭst*, one who deals in tropes. See also TROPOLOGY.

TROPHI, n. plu. *trō'fī* [Gr. *trophos*, a feeder—from *trephein*, to feed]: those parts of the mouth in insects which are concerned in the acquisition and preparation of food TROPHIC, a. *trŏf'ĭk*, or TROPH'ICAL, a. *ĭ-kăl*, connected with nourishment; nourishing; nutritious. TROPHOSOME, n. *trŏf'ō-sōm* [Gr. *sōma*, body]: the collective assemblage of the nutritive zooids of any hydrozoon.

TROPHONIUS, *trō-fō'nĭ-ŭs:* in Greek mythology, a skilful architect; son of Erginus, King of Orchomenus, or of Apollo. With his brother, Agamedes, he built the temple of Delphi and the treasury of King Hyrieus in Bœotia. After death he was worshipped as a hero, and had a celebrated oracle in a cave at Lebadeia (Livadia) in Bœotia. 'The entrance to the oracle was a very narrow aperture on the summit of a mountain, protected by a marble parapet about two cubits in height, and by brazen spikes above it.' The votary who wished to enter the 'Cave of Trophonius, to consult the oracle, after preparing himself for several days by purification and sacrifice, lay on his back, put his feet into the cave, and, caught by some unseen force, was pulled inside.

TROPHOSPERM, n. *trŏf'ō-spĕrm* [Gr. *trophos*, a feeder; *sperma*, seed]: in *bot.*, the placenta.

TROPHY, n. *trō'fĭ* [F. *trophée*, a trophy—from L. *tropæum;* Gr. *tropaion*, a sign and memorial of victory, consisting originally of a trunk of a tree on which were fixed the arms, shields, helmets, etc., taken from the enemy—from *tropē*, a turning, a putting to flight—from *trepō*, I turn: It. *trofeo*]: anything taken from an enemy which can be shown as evidence of victory; something preserved as a memorial of victory; articles of produce or manufacture artistically arranged and exhibited. TRO'PHIED, *-fĭd*, adorned with trophies.—A *Trophy* was originally a memorial of victory erected on the spot where the enemy had turned to flight. Among the Greeks (except the Macedonians, who erected no trophies), one or two shields and helmets of the routed enemy, placed on the trunk of a tree, served as the sign and memorial of victory. After a sea-fight, the trophy consisted of the beaks and stern-ornaments of the captured vessels, set up on the nearest coast. It was considered wrong to destroy such a trophy; and equally wrong to repair it, when it had fallen down through time, for animosity ought not to be perpetual. In early times, the Romans never erected trophies on the field, but decorated the buildings at Rome with the spoils of the vanquished. In later times, pillars and triumphal arches were reared to commemorate victories.

TROPICAL, a. *trō'pĭ-kăl:* figurative: see under TROPE.

TROPICAL, a. *trŏp'ĭ-kăl:* pertaining to the tropics: see under TROPICS.

TROP'IC-BIRD: bird of genus *Phaëton*, ranked by some in family *Pelecanidæ*, by others in *Laridæ*. The bill is strong, pointed, and almost arched; the head completely feathered; wings are long; tail is short, except two very long and slender feathers. Only two species are known, both tropical, and often seen far from land. The COMMON TROPIC-BIRD (*P. æthereus*) is about the size of a partridge, white, with curved lines of black on the back; some of the quill-feathers black, tipped with white. It is found in the Atlantic; while in the Indian and Pacific oceans the other species (*P. phœnicurus*) appears, of pale rose-color, with black wing coverts, and the long feathers of the tail red. The T.-B. breeds on high cliffs.

TROPICS, n. plu. *trŏp'ĭks* [L. *tropĭcus;* Gr. *tropĭkŏs,* of or belonging to a turn or turning—from *trepō,* I turn: F. *tropique:* It. *tropico*]: the two circles of the celestial sphere, one n. and the other s. from the equator at a distance of about 23° 28′, and parallel to it, within the limits of which the sun moves in his yearly course—the one n. of the equator, the *Tropic of Cancer,* the one s., the *Tropic of Capricorn;* the region between the tropics: see ARMILLARY SPHERE. The *tropics* mark out the limits of the torrid zone, or that portion of the earth's surface over any part of which the sun is vertical twice in the year. TROP'ICAL, a. *-ĭ-kăl,* or TROP'IC, a. *-ĭk,* pertaining to or incident to the tropics. TROP'ICALLY, ad. *-lĭ.*

TRO'PINE: $C_8H_{15}NO$, an organic basic substance obtained by action of heat and baryta on the alkaloid atropine. Colorless crystals soluble in water and alcohol.

TROPOLOGY, n. *trō-pŏl'ŏ-jĭ* (Gr. *tropos,* a trope; *logos,* discourse]: a rhetorical or figurative mode of speech. TROPOLOGICAL, a. *trō-pō'lŏj'ĭ-kăl,* varied or expressed by tropes; figurative.

TROPPAU, *trŏp'pow:* town, cap. of Austrian Silesia, on a tributary of the Oder, 184 m. n.e. of Vienna by railway, near the Prussian border. It is the seat of the provincial govt., and has a castle, cathedral, several palatial buildings, churches, and public schools, a library of 32,000 vols., a museum of Silesian antiquities, important manufactures of machinery, cottons, linens, and beet-root sugar; and active transit trade.—Pop. about 25,000.

TROSSACHS, Scotland: a romantic defile forming an approach to the Western Highlands, in Perthshire, about 8 miles west of Callander. It extends for about a mile between Lochs Ackray and Katrine, winding between Ben A'an on the north and Ben Venue on the south, and confined by lofty rugged precipices covered to their summits with birch, pine, and other trees. It is a favorite region for tourists.

TROT, n. *trŏt* [F. *trotter;* It. *trottare,* to trot: Gael. *trot,* to trot: Ger. *trott* or *trapp,* the sound of the footfall: W. *trotio,* to trot: Ger. *treten,* to step]: the pace of a horse or other quadruped faster than walking, the limbs moving in pairs diagonally, but not quite simultaneously; an affectionate name for a child; a contemptuous name for an old woman: V. to move faster than a walk; to cause to move fast. TROT'TING, imp.: ADJ. moving with a trot. TROT'TED, pp. TROT'TER, n. *-tĕr,* a quadruped that trots. TROT'TERS, sheep's or pigs' feet cooked.

TROTH, n. *trŏth* [AS. *treowthu,* truth—from *treowe,* true: Icel. *tryggth,* troth, truth (see TRUE)]: faith; fidelity; truth. TROTH'LESS, a. *-lĕs,* in *OE.,* faithless. TROTH-PLIGHTED, a. having fidelity pledged.

TROTTOIR, n. *trŏt-wâr'* [F.]: the footway on each side of a street; the foot-pavement.

TROUBADOUR, n. *trô bă-dôr'* [F. *troubadour*—from Prov. *trobador*—from *trobar*, to find, to invent: Sp. *trovador;* It. *trovatore*, a troubadour: F. *trouver;* Sp. *trovar;* It. *trovare*, to invent, to compose—perhaps from mid. L. *tropus*, a song, singing, in *classical L.*, a trope (see TROPE)]: one of a school of lyric poets who flourished in the eleventh, twelfth, and thirteenth centuries in the s. of France, n. of Spain, and n. of Italy. In Provençal poetry (see TROUVÈRE), a T. was a polished and cultivated poet—what the Germans call a *Kunstdichter* (art poet)—who did not make a trade of his muse; as distinguished from the musician and jongleur, who wandered about the country singing for money. This distinction only gradually showed itself. At first, all classes of the community were nearly equally rude, and what pleased the peasant in the shape of song, pleased the prince also; but by degrees, a superior refinement and sensibility manifested themselves in the tastes and manners of courts, and this superiority found poetical expression in a more artistic verse. Great nobles, princes, and kings who practiced verse-making for their pleasure, or out of chivalrous gallantry, were always called troubadours; while inferior knights, court-attendants (M. Lat. *ministeriales;* hence *menestrels*, minstrels), and even citizens and serfs who lived by their art, or at least took money for the exercise of it, were called sometimes troubadours, sometimes jongleurs: see MINSTREL: also ROMANCE: ROMANIC LANGUAGES. The more celebrated troubadours had one or several such jongleurs in their service, as it was considered *infra dig.* for a poet to be his own fiddler. This new T. poetry (*art de trobar*), which was *lyrical*, while the popular minstrelsy was mainly of the *epic ballad* sort, exercised considerable influence on the advancement of literature and culture generally; yet those who practiced it never formed themselves into a guild, or into special schools, but preserved a certain individualism, which gives picturesqueness to the outlines of their history. At all the courts (great and small) in s. France, n. Spain, and Italy, they were esteemed a brilliant ornament of society; princes and fair dames (often themselves troubadours) were proud of their praise, or dreaded the raillery of their satiric muse; while, on the other hand, the majority of the troubadours gladly attached themselves to the court of a great prince or noble, sometimes praising their master in *sirventes* (service-songs), sometimes censuring him, but at any rate, always selecting some lady as the 'mistress of their heart,' to whom they, under a general or allegorical name, addressed their love-songs (*cansos*), and whose cruelty they bewailed in songs of lamentation (*planes*), or whose death they mourned in threnodies. Although the 'love-service' of the troubadours was often merely artificial gallantry, yet frequently the sport passed into fatal earnest, with consequences of adultery, murder, and revenge.

When, as often happened at great court-festivals, several troubadours were present, they often indulged in competitions or verse-battles (*tensons*) among themselves, for

gratification of the high society assembled; mostly on questions selected by the ladies from the 'Laws of Love;' one or more of these ladies sitting as umpires at such poetic jousts, and deciding who were the victors. But though the troubadours as a rule monotonously confined themselves to themes of gallantry, yet sometimes their muse, especially in its satiric moods, ventured into higher regions, and glanced at the general conditions of society, or the graver evils of the times—as the persecution of the Albigenses; the degeneracy of the clergy; the diminishing zeal for the Crusades, etc.; or they even descended to depict the life of the peasantry, and sang their adventures with shepherdesses, etc. in *pastoretas* and *vaqueyras*. The most illustrious patrons of the troubadour poetry were the counts of Provence, particularly Raimund Berengar III. (1167–81), Alphonse II. (1196–1209), and Raimund Berengar IV. (1209–45); the counts of Toulouse, as Raimund de St. Gilles, who joined the ranks of the Crusaders 1096. Raimund V. (1148–94), and Raimund VII. (1222–49); Richard *Cœur de Lion* of England, himself a T.; Eleanor, wife, first of Louis VII. of France, afterward of Henry II. of England; Ermengarde, Viscountess of Narbonne; the kings of Aragon, as Alfonso II. (1162–96), Pedro II. (1196–1213), and Pedro III. (1276–85); the kings of Castile, as Alfonso IX. (1188–1229), and especially Alfonso X. (q.v.), surnamed the Wise; several Italian princes, as Bonifacio, Count of Montferrat, and after 1204 king of Thessalonica; and Azzo VII. of Este (1215–63). These names also indicate the extent of territory on which the T. poetry was cultivated—viz., Provence, Toulouse, Poitou, Dauphiné, or briefly France s. of the Loire; Catalonia, Valencia, and Aragon in Spain; and part of upper Italy. It lasted about 200 years (1090-1290); and three periods can be distinguished in its history: (1) The period of its genesis, or its development out of mere popular minstrelsy into artistic poety (1090–1140); (2) its golden age (1140–1250); (3) the period of its decline (1250–90). The second of these periods shows the loftiest expression of ideal chivalry and gallantry, and the most perfect development of artistic form. The last period was marked by an increasing serio-didactic tendency, and degeneracy in poetic art. Thus the poetry of the troubadours rose, and ruled, and fell with that courtly chivalry which was its inspiration.

The long list of troubadours begins with GUILLEM IX., Count of Poitiers (1087–1127): his life and works appear to have been equally immoral.—BERNARD DE VENTADOUR (1140–95), one of the first troubadours of the golden age, was the son of a poor serf of Vicomte Ebles II. of Ventadour: he celebrated in fiery and delicate strains the charms of Ebles's wife, Agnes de Montluçon, and of his later patronesses, Queen Eleanor, Joanna of Este, etc.—MARCABRUN (1140–85), a foundling, was murdered by the castellan of Guian for an exercise of his fatal gift of satire: he is reckoned the inventor of the art-song (*Cansôs*).—JAUFRE RUDEL, Prince of Blaya (1140–70), is famous

for his languishing love-songs and for his romantic passion for the Countess of Tripoli, whom he never saw till he was at the point of death.—PEIRE D'AUVERGNE (1152-1215), produced songs more remarkable for artistic finish than for poetic inspiration.—GUILLEM DE CABESTAING (1181–96), was famous for his tragic love for the wife of his lord, Raimon de Roussillon.—RICHARD THE LION-HEART'S song composed during his captivity in Austria is widely known; and the songs of GUIRANT DE BORNEIL (1175–1220) have a manly ring; but perhaps the most celebrated of the whole fraternity was PEIRE VIDAL (1175–1215), wondrously endowed with poetic gifts, but whose mad, wasteful, immoral life makes his sanity doubtful.—BERTRAND DE BORN (1180–95), celebrated as warrior and poet, produced songs mostly martial and patriotic.—FOLQUET DE MARSEILLE (1180–1231), after wasting his youth in amorous gayeties, in a fit of grief for the death of one of his many mistresses, entered the priesthood, became bp. of Toulouse, and persecuted the Albigenses with fanatical zeal: his 25 songs are of an impassioned nature.—RAMBAUT DE VAQUEIRAS (1180–1207), native of s. France, son of a knight, was so great a favorite with Bonifacio II., Marquis of Montferrat, that the marquis tolerated his sister's intimacy with the poet; he accompanied his patron to the East, and probably fell with him fighting against the Bulgarians.—PEIROT (1180–1225) produced some of the finest love-songs of the troubadours.—THE MONK OF MONTAUDON (1180–1200) is a T. whose proper name is not known: he was of a noble family in Auvergne, and became prior of Montaudon; but led the free life of a wandering poet: his songs are full of personalities against his brother troubadours—very cynical and very caustic.—ARNAULT DANIEL (1180–1200), nobleman of Riberac, in Périgord, whom Petrarch calls *il grande maestro d'Amore:* Dante also celebrates his genius.—GAUCELM FAIDIT (1190–1240), who left his wife, and, as a T., sang the praises of Countess Marie of Ventadour; afterward, in revenge for her prudence, entering into intrigues with other women.—RAIMON DE MIRAVOL (1190–1220), one of the most lovable of the troubadours, though bitterly abused by the women poetesses of his time.—SAVARIE DE MAULEON (1200–30), French baron, grand seneschal of Aquitania; noted for his *Tenzone.*—PEIRE CARDINAL (1210–30), son of a knight, and who travelled with his jongleur from court to court, and having Jago I. of Aragon as his great patron: he satirized the nobles and clergy.—GUIRAUT RIQUIER (1250–94), native of Narbonne, last representative of the troubadours, and whose most distinguished patron was Alfonso X. of Castile: his poems, full of complaints of the disrepute into which his order had fallen, are the swan-song of T.-poetry.

See Diez, *Leben und Werke der Troubadours* (Zwickau 1829); Fauriel, *Histoire de la Littérature Provençale*, 3 vols. (Par. 1846); Galvani, *Osservazioni sulla Poesia de' Trovadori* (Modena 1829), and *Fiore di Storia letteraria e cavalleresca della Occitania* (Milan 1845); De Laveleye, *Histoire de la Langue et de la Littérature Provençale* (Bruss. 1845);

Mahn, *Die Werke der Troubadours* (Berl. 1846), and *Die Biographien der Troubadours* (Berl. 1853); Brinckmeier, *Blumenlese aus den Werken der Troubadours* (Halle 1849), and *Rügelieder der Troubadours* (Halle 1846); Kannegiesser, *Gedichte der Troubadours* (Tüb. 1852), and *Ungedruckte Provenzal. Lieder* (1853); Bartsch, *Grundriss zur Geschichte der Provenzalischen Literatur* (1872); Bayle, *La Poesie Provençale au Moyen Age* (1876).

TROUBLE, n. *trŭb'l* [F. *troubler*—from a supposed mid. L. *turbulārĕ*, to trouble, to disturb—from L. *turba*, a crowd: Gr. *thorubĕō*, I disturb]: disturbance of mind; that which causes agitation or disturbance of mind; distress; anxiety; uneasiness; difficulty; labor or laborious effort: among *miners*, any shifting of the strata of a coal-field by which the regular and continuous working of its minerals is interrupted: V. to disturb; to put into confused motion; to grieve; to make uneasy; to molest; to engage overmuch; to give occasion of labor to, as, 'I shall not *trouble* you to write'; in *OE.*, to disorder. TROUB'LING, imp. *-lĭng:* N. the act of molesting or annoying; the act of afflicting. TROUBLED, pp. *trŭb'ld:* ADJ. disturbed; disordered. TROUB'LER, n. *-lẽr*, one who troubles. TROUBLESOME, a. *trŭb'l-sŭm*, causing annoyance; tiresome; giving inconvenience to; harassing; importunate; teasing; irksome; vexatious. TROUB'LESOMELY, ad. *-lĭ*. TROUB'LESOMENESS, n. *-nĕs*, the state or quality of being troublesome; irksomeness. TROUB'LOUS, a. *-lŭs*, agitated; full of trouble or disorder; causing great anxiety and distress.—SYN. of 'trouble, v.': to disturb; annoy; perplex; afflict; grieve; fret; distress; busy; tease; vex; harass;—of 'trouble, n.': molestation; obstruction; inconvenience; distress; grief; sorrow; calamity; misfortune; adversity; embarassment; misery.

TROUGH, n. *trŏf* [Icel. *trog;* Dan. *trug;* Wal. *troc;* Ger. *trog*, a trough]: a long hollow vessel of wood, stone, or metal, open at the top, for holding feeding-stuffs for animals, etc.; the channel that conveys water, as to a mill; in *geol.*, any sudden depression of strata by which they are made to assume a basin-shaped arrangement. TROUGH OF THE SEA, the long hollow between two waves. TROUGH-JOINT, in *geol.*, the fissure or joint frequently found to pass through the middle of the curvature of any sudden depression of strata.

TROUL, v. and n. *trowl:* same as TROLL 1 (q.v.).

TROUNCE, v. *trowns* [OF. *tronce*, a piece of wood; *troncer*, to mutilate, to tear in pieces: Sp. *tronzar*, to shatter: F. *tronçon*, a truncheon or short staff (see TRUNK)]: to beat with a truncheon: to cudgel; to punish severely; to scold or reprimand; in *OE.*, to defeat utterly; to discomfit TROUNC'ING, imp. TROUNCED, pp. *trownst.*

TROUP, *trôp*, ROBERT, LL.D.: lawyer: 1757–1832, Jan. 21; b. New York. He graduated at Columbia College, and then studied law; entered the army as lieut. 1776; was made prisoner in the battle of Long Island, and was exchanged 1777; was aide to Gen. Gates at Saratoga. T. was several years judge in N. Y., and member of the legislature. He wrote occasional pamphlets on political issues.

TROUPE, n. *trôp* [F. *troupe*—from mid. L. *tropus*, a company (see TROOP)]: a company, especially used of stageplayers, circus-performers, minstrels, and the like; a band; a troop.

TROUS-DE-LOUP, n. *trô'dĕ-dô'* [F. *trou*, hole; *de*, of; *loup*, wolf]: *literally*, wolf-holes; holes and pitfalls dug in the form of inverted cones, about 6 ft. deep and 4½ in. in diameter, having pointed stakes fixed in the bottom, and almost reaching the top. They are placed often thickly about the glacis and approaches to a fortress; the object being to break the ranks and otherwise disorganize an attacking force.

TROUSE, n. *trowz* (Gael. *triubhas;* Ir. *trius*, breeches (see TROUSERS)]: in *Scot.* and *OE.*, breeches and stockings in one piece—an anc. Irish dress; trousers. TROUSED, a. *trowzd*, wearing trousers.

TROUSERS, n. plu. *trow'zërz* (Gael. *triubhas*, trews, trousers: W. *trws*, covering, dress: F. *trousse*, a truss, a bundle, breeches—from *trousser*, to tuck, to fasten up (see TRUSS)]: a garment, usually called a 'pair of *trousers*,' worn by men and boys, extending from the waist to the ankles, covering the lower part of the trunk, and each lower limb separately; pantaloons. TROU'SERING, n. *-zër-ĭng*, cloth used for making trousers.

TROUSSE, n. *erows:* the loppings from growing timber; the old spelling of TRASH (q.v.).

TROUSSEAU, n. *trôs-so'*, TROUSSEAUX, n. plu. *trôs-sōz'* [F. *trousseau*, a small bundle, an outfit—from *trousse*, a truss, a bundle (see TROUSERS): comp. Gael. *trussadh*, a gathering, a collection]: *literally*, 'a bundle'; the outfit of a woman about to be married, consisting of personal clothing, trinkets, presents, and the like; a bride's clothes.

TROUT, n. *trowt* [AS. *truht;* F. *truite;* It. *trota*—from L. *tructa;* ML. *trutta*, a trout: Gr. *trōktēs*, a voracious sea-fish—from *trōgein*, to gnaw, to bite—lit., 'the nibbler']: any of the various smaller species of freshwater fishes of the family *Salmonidæ;* especially a 'charr' of the genus *Salvelinus*, and specifically the speckled or brook trout of eastern North America (*S. fontinalis*). The name comes originally from the European brown trout (*S. faris*). The distinction between the closely related salmon-trouts (q.v.) and the true trouts, or charrs, is most surely found in the character of the dentition. Harris has explained the difference as follows:

'Put your finger in the mouth of your capture, and if you find the vomer, a bone situated on the front part of the roof of the mouth, flat, with teeth on its body, and behind these an irregular single or double series of teeth, you hold in your hand a salmon-trout. If you find the vomer much depressed, convex, and shaped like a boat, with teeth on the head of the bone, and none on its shaft, you have a charr under inspection.'

TROUT.

All of the American charrs, except the Dolly Varden and three of the Arctic species, are natives of the waters east of the Mississippi, the common brook or spreckled trout being the most widely distributed. The last species may be known at sight by the worm-like markings on the back, red spots on the sides, the large mouths, blunt snouts, and dark mottlings on their dorsal and tail fins. It is the most beautiful of all the charrs, by reason, as Harris writes, of the mantle of rose and violet which it wears, the mellow diffusion of which suggests and justifies the descriptive phrase so often applied to it by anglers—'the bloom of the trout.' It is to be found in the streams flowing north into the Arctic Ocean, as far west as Victoria Land; ranging north and westward to the tributaries of the Great Lakes, and as far south as the southern spur of the Georgia Alleghanies. It also occurs near the sources of some of the rivers flowing into the Mississippi River and the Gulf of Mexico. The habits of trout are as various as the streams in which they dwell and the moods of the weather, and anglers find constant novelty in studying them in an effort to overcome their devious and cunning ways. Their breeding is after the general method of their race, but they never go down into salt water. They mate late in summer, and the male keeps off intruders. The female uses her tail in making the nest, whipping the gravel until a hole is made about two inches deep, and then cleans the bottom for a foot or more around the hole. When she is ready to spawn the male knows it and approaches her. The ova are then dropped and the milt is deposited upon the eggs, the male being within a few inches of his consort. This occurs in northern New England in November or early December; farther north at early dates. But many of the eggs fail to become fertilized, dropping down stream on the current; they are devoured by minnows or other fish who are lurking in the vicinity. Probably not 5 per cent. of the ova dropped on natural spawning beds ever mature, while of those raised by the improved methods of the fish culturist fully 80 to 90 per cent. come to maturity in the hatching ponds. Unfortunately those raised by the artificial process are generally placed, when fingerlings, in streams abounding with their natural enemies, and but a small percentage of these innocents become yearlings, at which age they are able to take care of themselves.

The charrs are also represented in Maine and New Hampshire by the Sunapee trout (*Salvelinus alpinus aureolus*), which is classified by ichthyologists as a local variety of the European charr or saibling (*S. alpinus*), peculiar in its local coloration, and other characteristics. It is 'brownish, sides silver-gray, with small orange spots on sides above and below lateral line; caudal grayish; belly orange; anal orange, edged before with white; ventrals orange with a white band on outer rays; no mottlings anywhere.' This beautiful charr is as good to

eat as it is good to catch. It reaches a weight of 10 pounds, and rises freely to the fly in May and early June, after which, as the water grows warmer, it settles into deeper water, and in July and August takes a live minnow and fights finely at a depth of 50 to 60 feet. It is connected with its European type by the arctic trout, a variety (*arcturus*) of the Arctic coast north of Hudson Bay, and variety *stagnalis* of the rivers of Greenland and Boothia.

The quasky, or blueback trout (*S. oquassa*), is the smallest and one of the handsomest of the charr trouts. It never exceeds 12 inches in length, and is dark blue, the red spots small and round, and usually confined to the sides of the body. Its habitat is confined to Mooselucmaguntic Lake, of the Rangeley system, in Maine, although Professor Merriam states that identical fish have been caught in the lower Saint Lawrence River weighing 6 or 7 pounds. The blue-back lies concealed in the deep water during the greater part of the year, but about October 10 comes near the shore and ascends in shoals the Kennebago River for the purpose of spawning. Half a mile above its mouth the Kennebago receives the outlet of Lake Oquassa; the trout then leaves the Kennebago to the left and runs toward Oquassa Lake, when its voyage comes to an end. About the middle of November it goes back to Mooselucmaguntic Lake and is seen no more until October of the next year.

The blueback resembles the Sunapee trout more than any other of the charr species, yet differs from it in size, spawning habits, and markings of the young. Varieties of it are known in certain lakes in northern Quebec, and in the rivers of the Arctic coast.

The only trout native to the waters west of the Rocky Mountains is the red-spotted, bull or Dolly Varden (*S. malma*). It is found in the streams east and west of the Cascade Range from the upper Sacramento to Montana. It is a gaudy and large species, and good, but is not the equal of its Eastern congeners in game qualities.

Trout are justly regarded as the most interesting of all the smaller fishes that attract the angler. They are taken with the garden worm, the grub, the live minnow, and the artificial fly. See ANGLING. For artificial cultivation, see FISH-CULTURE.

TROUVÈRE, *trô-vär':* a member of the class of ancient poets of northern France, corresponding to the troubadour of Provence. Their productions partake of a narrative or epic character, and thus contrast broadly with the garden worm, the grub, the live minnow, and the their southern rivals.

TROUVILLE, *trô-vēl*, France: a fashionable watering-place on the English Channel, in the department of Calvados, situated at the foot of a hill on the right bank of the Touques at its mouth, near the mouth of the Seine, 10 m. s. of Havre. It has a harbor, comprising

an inner and an outer basin, and a splendid beach. The Casino or Salon offers all the attractions usually found in such institutions. The season is at its height in August. Pop. (1901) 6,137.

TROVER, n. *trō'vėr* [OF. *trover;* F. *trouver;* It. *trovare,* to find—according to Diez, from mid. L. *turbārĕ,* to move, to seek for, to find (but see TROUBADOUR)]: the finding of anything: in *law,* (1) the obtaining possession of any goods by finding them, or by various means other than by purchase; (2) a common-law action brought to recover goods from a person to whom they do not belong, but who has in some way obtained possession of them. Such an action was originally founded on the old fiction that the rightful owner had accidentally lost the goods, and the party in possession had found them, and would not give them up to such owner. It is practically an action to try the title to the goods, and therefore is of extensive application in the law of contracts, as well as other branches of law. When, in an action of trover, judgment is given for the plaintiff, the defendant must make good the damage and repay the costs of action: the amount of damages is the value of the property when taken by the defendant, with interest. When plaintiff is defeated, the defendant recovers costs.

TROW, v. *trō* [AS. *treowian,* to trust, to believe; *treowa,* trust, faith (see TRUE)]: in *OE.,* to think; to imagine; to conceive; to believe: *trow* is also used with *I* (expressed or understood) as an exclamation of inquiry or surprise, and is nearly equal to 'I wonder.' TROW'ING, imp. TROWED, pp. *trōd.*

TROWBRIDGE, *trō'brĭj:* ancient town of Wiltshire, England; on a rocky eminence in the valley of the river Mere or Biss, 10 m. s.e. of Bath, about 98 m. w. of London. In the church of St. James, which dates from the 14th century, Crabbe the poet officiated as clergyman 1814-32, and his remains repose under a monument in the chancel. The town, since the reign of Henry VIII., has been the seat of woolen manufactures, much extended in recent years; cassimeres, kerseys, tweeds, and woolen cloths of the best qualities are made. Many handsome villas have been erected outside the town by the prosperous manufacturers.—Pop. urban sanitary district 11,526.

TROWBRIDGE, JOHN, S.D.: American scientist: b. Boston, Mass., 1843, Aug. 5. He was graduated from the Lawrence Scientific School, Harvard University, in 1866, and served as instructor there 1866-9. He was assistant professor of physics at the Massachusetts Institute of Technology in 1869-70, and filled the same position in Harvard 1871-81. He was professor of experimental physics at Harvard 1880-8, and in the year last named became Rumford professor of applied science there and director of the Jefferson Physical Laboratory. In 1878 he was elected a member of the National Acad-

emy of Sciences, and later was vice-president of the American Academy of Arts and Sciences. He has published: *The New Physics* (1884); *What is Electricity?* (1896); *The Resolute Mr. Pansy* (1897); *Three Boys on an Electric Boat* (1894); *The Electrical Boy* (1891); *Philip's Experiments, or Physical Science at Home* (1898); and many papers on physics and more especially on electricity.

TROWBRIDGE, John Townsend, A.W.: American author: b. Ogden, N. Y., 1827, Sep. 18. He received a common school education, farmed in Illinois, and then went to New York in 1846, where he wrote for journals and magazines, and in 1848 removed to Boston. In 1850 he edited for a time Ben Perley Poore's journal, *The Sentinel,* but an editorial by him against the fugitive slave law put an end to his labors in that quarter. His story, *Neighbor Jackwood* (1856), was an eloquent and effective protest against slavery, which was very successfully dramatized and was a most important factor in the formation of public opinion at the North. He was managing editor of *Our Young Folks,* 1870-3, was one of the original contributors to *The Atlantic Monthly,* in which magazine his autobiography, *My Own Story,* appeared in 1903. He is best known at present as a writer of juvenile fiction, but he has written several novels and collections of short stories, and several books of verse. *The Vagabonds* is his best-known poem, but as a poet he is seen at his best in such poems as *Midsummer* and *At Sea.* Among his juvenile fictions may be mentioned the *Jack Hazard Series* (1871-5); *The Tide Mill Series* (1882-7); and *The Little Master,* which is more or less autobiographic; while among his books for older readers are: *Father Brighthopes* (1853); *Cudjo's Cave* (1864), which had a phenomenal sale of 13,000 copies in a week; *Lucy Arlyn* (1866); *The Vagabonds and Other Poems* (1869); *Coupon Bonds and Other Stories* (1871); *The Emigrant's Story and Other Poems* (1875); *The Lost Earl and Other Poems* (1888). His complete poetical works were issued in 1903. For many years he has lived in Arlington, Mass.

TROWBRIDGE, William Petit: American engineer: b. in Oakland co., Mich., 1828, May 25; d. New Haven, Conn., 1892, Aug. 12. He was graduated at West Point in 1848, served there during the last year of his cadetship as assistant professor in chemistry, later as assistant in the astronomical observatory, and in 1851 was assigned to the coast survey. His work on the Pacific coast in 1853 embraced a series of magnetic and tidal observations covering a distance of over 1,300 m., from San Diego to Puget Sound. In 1860, at Key West, Fla., he superintended the erection of the first permanent self-registering magnetic observatory in the United States. After the outbreak of the civil war he furnished minute descriptions of the rivers, harbors, and inlets of the

southern coast to the war department, and later was stationed at New York, where he superintended the accumulation and transmission of field-supplies. Besides these duties he superintended the construction of fortifications at Willett's Point and at Governors Island, and the repairs of Fort Schuyler. In 1870 he became professor of mechanical engineering in the Sheffield Scientific School at Yale, and later held a professorship in the Columbia School of Mines, and at both institutions rendered an efficient service in the establishment and development of new courses of instruction. To him belongs the credit for the design of the first cantilever bridge, details of which are given in his work, *Proposed Plan for Building a Bridge across the East River to Blackwell's Island* (1869). A company was formed to carry out the scheme, but the financial crisis of 1873 put an end to the plan. He was the inventor of a coil-boiler, utilizing the latest knowledge in forced circulation of water. His publications include *Heat as a Source of Power* (1874), and *Turbine Wheels* (1879).

TROWEL, n. *trow'ĕl* [F. *truelle;* L. *trulla,* a trowel, dimin. of *trua,* a stirring-spoon, a ladle]: a flat, somewhat broad tool used to take up and spread mortar; a similar scoop-shaped tool, used by gardeners. TROW'ELLED, a. *-ĕld,* formed with a trowel.

TROWS, n. plu. *trowz:* supernatural beings in Orkney and Shetland similar to TROLLS (see TROLL 2).

TROWSERS: another spelling of TROUSERS (q.v.).

TROY, or ILIUM: a famous ancient city in the northwestern part of Asia Minor, the capital of the Troad, a region lying on the coast of the Ægean Sea, at the entrance to the Hellespont (Dardanelles). The fame of Troy rests upon the two Homeric epics, the Iliad and the Odyssey (see HOMER), which, incidentally to their main themes, give an account of the long war in which the city was finally destroyed. The date of the latter event is generally placed at 1184 B.C. The cause of the war was the abduction of Helen, the wife of King Menelaus of Sparta, by Paris, son of the Trojan king, Priam. Almost all the states of Greece proper united to avenge the insult, and, under the leadership of Agamemnon, king of Mycenæ, landed on the Trojan coast with a large army. After besieging the city in vain for nine years, they finally took it by a stratagem. They placed outside the walls a large wooden horse in whose interior a number of Greek heroes were concealed, and the rest of the army then retired to the ships as if they had given up the siege. The Trojans in exultation dragged the horse within the walls, and during the night the Greeks came forth and were joined by the main army which had returned from the ships. The city was now given over to fire, plunder, and massacre. Among those who escaped was Æneas, who reached Italy, and, according to the legend, was the ancestor of the first Roman kings. The

TROY.

Homeric legend of Troy is believed by modern scholars to be woven around a nucleus of fact. About the 6th century B.C. a new Troy, *Ilium Novum*, was founded on what has ever since been believed to be the site of the Homeric city. The place is now called Hissarlik, and lies a few miles from the southwestern entrance to the Dardanelles. Here Dr. Schliemann began excavations in 1871 and again in 1890, and his researches prove that the site has been occupied successively by seven cities. The second of these from the bottom bears marks of having been destroyed by a conflagration. Schliemann uncovered several of the gates of the city (supposed Troy), the s. and w. wall, and two small buildings which he took to be remains of Priam's royal palace. Of most interest is the 'treasury' which he discovered near the s.w. gate. It contained copper utensils, beakers, cups, personal ornaments (chains, bracelets, diadems, rings) of gold and silver, which indicate a stage of culture answering to the period about B.C. 2000. These treasures are mostly deposited in the Berlin Museum of Ethnology. He exhumed also enormous quantities of prehistoric and other pottery, besides numerous weapons of bronze and stone. Dr. Schliemann considered this second city to be the city of Priam and the Homeric legend, but later excavations have shown that only the sixth (the fourth from the top, later discoveries having increased the total number to nine) city can be referred to the period described in Homer. Of this city nothing remains except portions of the colossal and well-built outer walls. Consult: Schliemann, *Trojanische Altertümer, Ilios, Troja;* Schuchardt, *Schliemann's Ausgrabungen;* Schmidt, *Schliemann's Sammlung trojanischer Altertümer;* Brentano's *Zur Lösung der troianischen Frage;* R. C. Jebb's *Schliemann's Ilios* (*Edinb. Rev.*, CCCIV.); W. J. Stillman's *Découvertes de Schliemann* (*L'Homme*, 1884, Oct.).

TROY: city, county-seat of Pike co., Ala.; on the Central of Georgia and the Alabama Midland railroads; about 80 m. s.w. of Columbus, and 72 m. s. by e. of Montgomery. It is an agricultural region in which cotton is one of the principal products. Its industries are connected chiefly with the cultivation and marketing of cotton. The educational institutions are Troy Industrial Academy for colored pupils, and public schools. There are two private banks. Pop. (1910) 4,961.

TROY: city, county-seat of Lincoln co., Mo.; on the St. Louis and Hannibal railroad; about 50 m. n.w. of St. Louis. It is in a region rich in deposits of glass sand, iron ore, and coal, and surrounded by fertile agricultural lands. The chief manufacturing establishments are flour mills, butter and cheese factories, and tobacco factories. The shipments are chiefly farm and dairy products, tobacco products, and live stock. There is one high school, public elementary schools, and a library. There are two state banks. Pop. 1,250.

TROY.

TROY: city, cap. of Rensselaer co., N. Y.; on the Hudson river at head of steamboat navigation, on the Champlain and the Erie canals, and on the New York Central, the Delaware & Hudson, the Boston & Maine, and the Rutland railroads. In addition to these important transportation facilities T. has the advantage of trolley connections with cities to the south and west. The cities of Watervliet and Cohoes, and the villages of Waterford and Green Island, on the opposite side of the river, are connected with T. by bridges and street railroads. Water is obtained from the Piscawen kill in the n., the Poesten kill, about 2 m. s., and the Wynants kill in the s.; and excellent motive power is furnished by the Hudson river, which has here been dammed by the State. T. has long been noted for the variety and extent of its manufactures, ranking fifth in industrial importance among the cities of the State. It is the principle centre of the shirt as well as of the collar and cuff manufacture in the United States. Both of these industries originated in T.; the manufacture of collars was begun in 1827 and the shirt manufacture in 1830. As early as 1852 sewing machines were employed in the shirt factories, and in 1855 steam was applied to operate these machines. Auxiliary industries have grown up around the shirt and collar industry, and given T. a wide reputation, especially for its laundering processes and machinery. T. was also for a long time the centre of the iron and steel industry in New York State: in 1865 the second Bessemer steel plant in the United States was built here. This industry has, however, declined in importance. Other important industries are the manufacture of stoves, hosiery and knit goods, machines, valves, etc., and paper and wood pulp (the first paper mill having been built in 1792).

Much of the city is built on a plain, whence the surface rises to a range of hills on the n. and e., 300–400 ft. above the river—Mt. Ida, on the e., and Mt. Olympus, on the n., being the most conspicuous elevations. Except along the river front, the streets are regularly laid out; Prospect Park is located on one of the spurs of Mt. Ida, and there are numerous smaller parks and open squares; in one of the latter is the Soldiers and Sailors Monument, the basreliefs on its base representing battle scenes of the Civil War, among them the fight between the Monitor and the Merrimac. Oakwood Cemetery, one of the most beautiful burial-places in the country, contains the graves of Gen. George H. Thomas, 'the Rock of Chickamauga,' and of Gen. John E. Wool. At the latter is a monument 75 ft. high, said to be the largest stone quarried in the U. S. The cemetery also contains the Earl Crematory, equipped with the most modern apparatus for cremation. Among the important public buildings are the post office, the court house, city hall, the Rowe Memorial building and the Polytechnic Alumni Hall. There are a number of charitable institutions in the city, including the Troy Orphan Asylum, which occupies a notable group of buildings, a home for the aged, three Roman Catholic orphan-

ages, the Troy Hospital and the Samaritan Hospital, both of which have training schools for nurses. The Young Women's Association, the Young Men's Christian Association, and the Railroad Y. M. C. A. have prosperous organizations, and maintain libraries and reading rooms. T. is an educational centre of some note; in addition to its excellent public schools, including two high schools, it is the seat of the Emma Willard Seminary; the Rensselaer Polytechnic Institute, an important school of civil engineering; the Troy Academy; La Salle Institute; and the Troy Business College.

There was a fortified village of the Mohegan Indians on the east side of the Hudson river, where T. now stands, and the greater part of the site was purchased from these Indians 1659. During the Revolutionary War the islands of the Mohawk near Troy were fortified by the American troops, and they encamped here before marching northward to the battle of Saratoga. T. was laid out as a village under the name of Vanderheyden by people from New England 1787, attracted to the site by the advantages for trade afforded by the Hudson. The name was changed to T. 1789; the first religious organization (First Presb. Chh.) was formed and the first newspaper issued 1791; the first church building was erected 1792, the village became the seat of the co. buildings 1793 and was incorporated 1796. In the War of 1812 T. supplied a large part of the beef to the army. It was incorporated as a city in 1816. In 1823 the State dam on the Hudson was built, and from that time the industries and population of T. began to increase rapidly. T. has suffered from several destructive fires, the largest in May 1862, which destroyed over $2,000,000 worth of property. About the time that T. was settled, another settlement three miles above was begun under the name of New City, later called Lansingburg. Though Lansingburg at first was more prosperous than T., the latter soon surpassed it in rapidity of growth; the two grew toward each other, however, until there was no real dividing line between them, and in 1900 they were united in one municipal government by an act of legislature; the union did not take effect until January 1901, so that the statistics for Troy in the census of 1900 did not include those of Lansingburg. The city government consists of a mayor elected for two years and a common council of two members from each ward. A new gravity system of waterworks has been recently installed, costing about $1,250,000. Pop. (1901, including Lansingburg) 75,057; (1910) 76,813.

TROY: town, cap. of Miami co., O.: on Great Miami river and the Miami canal, and on the Cincinnati Hamilton and Dayton and the Cleveland Cincinnati Chicago and St. Louis railroads; 20 m. n. of Dayton, 63 m. w. of Columbus. The swift current of the river affords excellent power for many manufactories. The town is in an agricultural region, and contains a court-house, municipal building, 10 churches, high and graded public schools, several flour-mills, national banks and daily and weekly newspapers. Pop. (1900) 5,881; (1910) 6,122.

TROYAN, Constant: French painter: b. Sevres 1810, Aug. 25; d. Paris 1865, Feb. 21. He was one of the first and greatest of the French 'Naturalists,' and was trained as a painter on porcelain. His pictures rank high among those of his contemporaries, and his cattle and landscapes rival the best productions of the Dutch school. There are several good examples of his work in the New York Metropolitan Museum, and among them *Cow*, and *Landscape and Cattle.*

TROYES, *trwä*, France: capital of the department of Aube, and formerly of the province of Champagne, 103 m. e.s.e. of Paris by rail, on the left bank of the Seine. Many of the streets are narrow and irregular, and lined with mediæval timber houses. The principal edifices are the cathedral, a splendid specimen of florid Gothic; the churches of Saint Urbain, of Saint John, and of Saint Madeleine, in the flamboyant style; the *hôtel-de-ville*, the prefecture, the hospital, museum, *palais de justice*, and public library, containing 100,000 printed volumes and nearly 5,000 manuscripts. The manufactures consist of cottons, woolens, hosiery, soap, artificial flowers, paper, gloves, etc. There are numerous worsted and cotton mills. It carries on an important trade in grain, wine, brandy, colonial produce, famous sausages, hemp, wax, wool, wood, iron, lead, zinc, etc. The town was in existence previous to the conquest of Gaul by the Romans, by whom it was called Augustobona. The Treaty of Troyes between Charles VI. and Henry V. of England was concluded in 1420. Nine years later the English were expelled by Joan of Arc. Pop. (1901) 53,159.

TROY-WEIGHT [said to be from *Troyes*, in France —a weight used at the fair of *Troyes*]: a standard of weight taking its name from the fair of *Troyes*, town of France, and an important centre of commerce in the middle ages, where a similar weight was in use. A troy pound (of what value is unknown) is mentioned in Britain first in 1414, long before which time the standard pound of 12 oz., as well as another pound (the Tower pound) of 12 oz., was in use. The term 'Troy' was applied to the standard pound first in 1495, but no change seems to have been made in its value; and it continued to be used exclusively by dealers in the precious metals, gems, and drugs: see Pound. The troy pound contains 12 oz., each ounce 20 pennyweights, and each pennyweight 24 grains (the grain being identical with the avoirdupois grain); thus the pound contains 5,760 grains, and is to the avoirdupois pound (which contains 7,000 grains) as 144 to 175; while the troy ounce is to the avoirdupois ounce (which contains 437½ grains) as 192 to 175. For medicines, other subdivisions of the troy pound were formerly employed; but now medicines are weighed by the avoirdupois standard. Troy weight is now used chiefly by goldsmiths and jewellers.

TROZO, or San José, Philippines: a suburb of the city of Manila, occupying the centre of the n.e. quarter

of the city, s.e. of Tondo. The people are largely engaged in the mechanical industries; there are also a few Chinese and native residents of the upper class.

TRUANT, a. *trô'ănt* [Bret. *truant,* a vagabond: Sp. *truhan,* a buffoon: F. *truand,* a vagrant: Cornish, *tru,* alas! W. *truan,* poor, miserable: Gael. *truagh,* wretched]: idle; lazy; wandering from business or duty; loitering: N. an idler; a scholar absent from school without permission; a loiterer: V. to idle at a distance from duty; to absent one's self from school without permission. TRU'ANTING, imp. TRU'ANTED, pp. TRUANCY, n. *trô'ăn-sĭ,* the act of playing truant; the state of being a truant. TO PLAY TRUANT, to be absent from school without leave.

TRU'ANT SCHOOL: the popular name for a school or reformatory for truant or vagabond children; organized under State auspices and managed by the State educational officials. In 1850, Massachusetts passed a law permitting the punishment of truancy by confinement. New Hampshire, New York, Rhode Island, and Connecticut made similar legislation before 1865; and New York and other cities made like provisions; but where the law was not a dead letter, habitual truants were classed as 'juvenile disorderly persons,' and were sent to almshouses or reformatories. In 1880, Massachusetts began to establish county schools for truants. In 1900 there were in the United States six county schools and seven city schools of this nature, five in New York, one in Boston, and one in Chicago. Many states and cities provide for the arrest of truants and their being replaced in the public schools, a method followed in continental Europe, where there are no institutions exactly parallel to the American truant school. In Great Britain there are two provisions for school offenders, the day industrial and the truant schools, based on the Industrial Schools Act of 1866, for 'any child found habitually wandering, or not under proper control, or in the company of rogues, vagabonds, disorderly persons, or reputed criminals'; or any child whose parents neglect to provide for its instruction.

TRUCE, n. *trôs* [It. *tregua;* F. *trêve,* formerly in the plu. *trêves,* a truce: Icel. *tryggr,* secure, trusty: Goth. *tryggva,* a covenant: comp. Gael. *truas,* pity (see TRUE)]: a temporary peace or suspension of hostilities agreed upon by contending forces or states, during which it is dishonorable to occupy more advanced ground, or to resort to any act which would confer advantage; but which may lawfully be broken before the prescribed period, on notice previously agreed on being given to the opposite party; this is called *denouncing a truce;* cessation; short quiet.

TRUCE OF GOD: the title given in the middle ages to a limitation of the right of private warfare introduced by the church in order to mitigate an evil which it was unable to eradicate. This truce of God provided that private feuds should cease, at least on the holy days,

from Thursday evening to Sunday evening in each week; also during the whole season of Advent and Lent, and on the octaves of the great festivals. This salutary regulation was first introduced in 1033 in Aquitaine, then in France and Burgundy. Under William the Conqueror it was introduced into England, and in 1071 into the Netherlands. At many councils it was a chief subject of discussion, and was enjoined by special decrees. Whoever engaged in private warfare on the prohibited days was excommunicated. The truce of God was also extended to certain places, as churches, convents, hospitals, churchyards, etc., and certain persons, as clergymen, peasants, merchants, pilgrims, and in general, all defenseless persons. At the Council of Clermont (1095) it was made to include all Crusaders. This institution died out when the rulers of the various countries became strong enough to curb effectually their turbulent and powerful subjects.

TRUCK, v. *trŭk* [F. *troquer;* Sp. and Port. *trocar,* to swap, to barter: F. *troc;* Scot. *trock,* exchange, barter: F. *truc,* a blow, a smack with the lips]: to exchange; to barter or give in exchange: N. traffic by exchange of goods; hence, commodities exchanged in such traffic. TRUCK'ING, imp. TRUCKED, pp. *trŭkt.* TRUCKAGE, n. *trŭk'āj,* the practice of bartering goods. TRUCK'ER, n. *-ėr,* one who trucks. TRUCK SYSTEM, the system formerly pursued in the United Kingdom and elsewhere by the owners of factories, and other large works, and by coal-masters, of compelling their work-people to take goods in exchange for their labor—a system put down in Great Britain by act of parliament 1831, though still covertly followed in many places. This thoroughly unjust and demoralizing system (or a system involving the same principle under some thin disguise), though never extensive in the United States, has been pursued by some large mining companies, and is still in use in a few districts; but is contrary to the laws in most of the states. In regions remote from a settled population, great companies (mining, etc.) may find a temporary necessity for keeping in store certain articles for sustenance of their workmen who may wish to buy from them; but this plan shuld be—(1) pursued no longer than is necessary; (2) administered on no scheme of profit to a powerful company from the necessities of helpless men.

TRUCK, n. *trŭk* [L. *trochus;* Gr. *trochos,* a hoop—from *trechein,* to run]: a small wooden wheel; a sort of platform running upon wheels or trucks; a small solid wheel for ordnance; a cylinder; the round disk at the top of a mast, a small hand-carriage with two very small wheels near one end for the removal of sacks, etc.; an open railway wagon for the conveyance of goods; a group of two or more pairs of wheels in one frame, used for supporting one end of a railway-car, a locomotive, or the like; a bogie; a kind of dray; the frames, wheels, springs, swing-bolsters, etc., which support the weight of the front of the locomotive. It usually consists of two

pairs of wheels held in a frame separate from the main-frame, and attached to the locomotive by the king-bolt or centre-pin, which passes through the 'truck centre-casting' and makes a flexible connection, somewhat like the arrangement by which the front axle of an ordinary wagon is attached to the body, which allows the truck to turn about the king-bolt, and thus enables the locomotive to run around curves easily. TRUCK-BRAKE, the air-brake equipment of the truck, as distinguished from the air-brake equipment of the driving-wheels. TRUCK CENTRE-CASTING, the cast-iron plate which is bolted rigidly to the transverse bars fastened to the sides of the truck-frame. In a swing-motion truck, the centre-plate is suspended from the transverse bars by links which allow it to swing transversely to the direction of the rails. The king-bolt or centre-pin passes through the centre-plate, and is in some cases provided with a key under the centre-plate, to prevent the locomotive from jumping off the track when running over a rough road-bed: V. in *rail.*, to convey by truck. TRUCK'AGE, n. *-āg,* the cost of transporting or moving goods by trucks.

TRUCKEE: a river, the outlet of Lake Tahoe in California. It flows n., then enters Nevada and flows e., then n., entering Pyramid lake, which has no apparent outlet. The river is about 125 m. long. Reno, Nev., is the most important town on the river.

TRUCKLE, n. *trŭk'l* [dim. from TRUCK 2]: a small wheel or caster; a truckle-bed: V. to roll or cause to roll; to roll on a wheel or something round; to lie or pass under something else; hence, to yield or bend obsequiously to the will of another; to submit servilely. TRUCK'LING, imp. *-lĭng:* ADJ. meanly obedient; cringing; servile: N. servile submission to the will of another. TRUCKLE-BED, a bed that can be rolled in under another and drawn out when wanted for use, also called *trundle-bed.*

TRUCULENT, a. *trô'kū-lėnt* or *trŭk'ū-lĕnt* [L. *truculentus,* very savage, fierce—from *trux* or *trucem,* fierce: It. *truculento*]: savage; of fierce aspect; destructive; cruel. TRU'CULENCE, n. *-lĕns,* or TRU'CULENCY, n. *-lĕn-sĭ,* savageness of manners; ferociousness of aspect. TRU'CULENTLY, ad. *-lĭ.*

TRUDGE, v. *trŭj* [Gael. *troidh,* the foot, the sole of the foot: W. *troed,* a foot: a variant of TREAD: comp. It. *truccare,* to trudge, to scud, to pack away nimbly]: to go steadily along; to jog or march heavily on; to travel or walk with labor and effort. TRUDG'ING, imp. TRUDGED, pp. *trŭjd.*

TRUE, a. *trô* [Icel. *trur,* sure, trusty: Dan. *tro,* true: Goth. *trauan;* Ger. *trauen,* to believe, to confide in]: in accordance with that which actually exists, or is done or said; conformable to fact or the actual state of things; not false or counterfeit; not perfidious; not fraudulent; conformable to rule; genuine; faithful; honest; right, free from falsehood. TRUE'NESS, n. *-nĕs,* sincerity; faith-

fulness; truth; exactness; accuracy. TRULY, ad. *trô'lĭ*, in reality; according to truth. TRU'ISM, n. *-ĭzm*, that which is self-evident: something trite. TRUE BILL, the formula by which the grand jury finds or approves a bill of indictment. TRUE-BLUE, a. inflexibly honest or faithful. TRUE-BORN, a. of genuine birth. TRUE-BRED, a. of a genuine or right breed. TRUE-HEARTED, a. sincere; not faithless or deceitful. TRUE-HEARTEDNESS, n. state of being sincere and faithful, honesty; sincerity. TRUE-LOVE, n. one really beloved. TRUE-LOVER'S-KNOT, or TRUE-LOVE-KNOT, n. a line or band, knotted with many folds, a supposed emblem of the interwoven affections. TRUE-PENNY, n. in *OE.*, an honest fellow.—SYN. of 'true': real; genuine; veracious; steady; honest; constant; loyal; exact; rightful; actual; positive; veritable; certain.

TRUFFLE, n. *trŭf'fl* [OF. *trufle;* Sp. *trufa;* It. *tartufo*, a truffle—from L. *tuber*, a swelling, a truffle: OF. *trufle* means also mockery, raillery, from which sense of the word comes Eng. *trifle*]: subterranean fungi belonging for the most part to the genus *Tuber*, family *Tuberaceæ*, of the class *Ascomycetes*. The mycelium of these fungi grows in the soil and in contact with the roots of certain trees, particularly oaks, in many regions of southern Europe. France is the great centre of truffle production, although some species occur abundantly in Italy. There are about half a dozen species of commercial importance, one or two of which are found occasionally even as far north as southern England. The more important species are the black truffle, *Tuber melansporum*, which furnishes perhaps nine-tenths of the commercial product. Other black truffles are *T. brumale* and *T. aestivum* (the summer truffle). These species are relatively more common in France; but in Italy, while the above are also well known, *T. moschatum*, commonly called the white truffle, is abundant. It is not, however, white, but the color of a yam. The black truffles mentioned are black or deep brown in color, with a warty surface, the surface protuberances being of very definite form. They vary in size from that of a nut to an orange. The white truffle, on the contrary, has a surface which is nearly smooth, and the maximum size somewhat exceeds that of the black truffle.

These plants are invariably found in clayey soils where the lime content is considerable. No species of true truffle has been found in sandy regions.

Owing to the fact that these fungi are subterranean, they have to be sought by animals with keen scent. Dogs and pigs are trained for this purpose. At the time when the truffle is full grown and ripe, its fragrant odor permits ready recognition by the animal. When the dog is used, it can, of course, only mark the spot where the truffle is to be found, but the pig will also do the work of lifting the truffle from its position, which may be several inches below the surface. Both dog and pig are constantly rewarded in their search by a small morsel

of food after each truffle is found. The pig is itself very fond of these fungi and will promptly appropriate its finds unless closely watched.

The truffles in general are valuable on account of their wonderful aroma and flavor. They are used therefore as condimental foods. In the United States a few small native species occur, practically all of these in California, but no forms of economic importance have yet been found in this country. The product which reaches this country is therefore in the form of preserved material which, while of a very agreeable flavor, nevertheless does not compare with the fresh product.

In northern Africa and in the Orient, especially in parts of Asiatic Turkey, there are found subterranean fungi, belonging to the genera *Terfezia* and *Tirmania*, of the family *Terfeziaceæ*, somewhat closely related to the *Tubcraceæ*, which are known as false truffles. These false truffles are found under herbaceous plants, principally of the order *Cistaceæ*. They occur in the lime-containing sands of arid sections. In northern Africa they are found as far south as the northern Sahara.

TRUISM, n. See under TRUE.

TRUJIL'LO. See TRUXILLO.

T-RULE. See T-SQUARE.

TRULL, n. *trŭl* [Ger. *trolle*, a coarse sluttish woman: Swiss, *trolle;* Swab. *trull*, a thick fat woman: Scot. *troll*, to work or walk in a slovenly manner]: a sorry wench; a vile strumpet; a vagrant strumpet.

TRULLAN, *trŭl'an:* an epithet sometimes applied to the ecclesiastical council, which is otherwise called the Quinisext (q.v.), from *Trullus* [Gr. *troullos*], the hall of the palace at Constantinople in which the Fathers assembled.

TRULLIZATION, n. *trŭl'lĭ-zā'shŭn* [L. *trullissārĕ*, to trowel, to plaster—from *trulla*, a trowel (see TROWEL)]: the laying of layers of plaster with a trowel.

TRULY, ad. See under TRUE.

TRUMBULL, *trŭm'bŭl*, BENJAMIN, D.D.: Congregational minister and author: 1735, Dec. 19—1820, Feb. 2; b. Hebron, Conn. He graduated at Yale 1759, and then was pastor of a chh. at New Haven 1760 till his death. In the revolutionary war he was chaplain and volunteer soldier. He wrote: *Vindication of the Conn. Title to the Contested* (western) *Lands; Complete Hist. of Conn.;* and Vol. I. of a *Gen. Hist. of the United States.*

TRUMBULL, ANNIE ELIOT: American novelist; daughter of J. H. Trumbull; b. Hartford, Conn., 1867, Mar. 2. She was graduated from the Harvard High School in 1876 and has published: *A Cape Cod Week* (1898); *Rod's Salvation* (1898); *Mistress Content Cradock* (1899); *Life's Common Way* (1903); and other works.

TRUMBULL, GURDON: brother of H. C. Trumbull, American artist: b. Stonington, Conn., 1841, May 5; d.

Hartford, Conn., 1903, Dec. 28. He learned his art in Hartford and New York. It was in studies of fish that he achieved his reputation, and his most noted works were *Over the Fall; A Plunge for Life;* and *A Critical Moment.* He was the illustrator of the work of his sister, Mrs. Annie T. Slosson, *The China Hunters' Club,* and was author of the work entitled *Names and Portraits of Birds.*

TRUMBULL, Henry Clay: American author and editor: b. Stonington, Conn., 1830, June 8; d. Philadelphia, Pa., 1903, Dec. 8. He was educated at Williston Seminary, East Hampton, Mass., and at first engaged in railroad business at Hartford, but in 1858 became State missionary of the American Sunday School Union for Connecticut. He was ordained to the Congregationalist ministry in 1862, entered the Union army as chaplain, and served through the war with the exception of a portion of 1863, when he was held a prisoner by the Confederates. He was appointed missionary secretary for New England of the American Sunday School Union in 1865, normal secretary in 1871, and in 1875 he removed to Philadelphia. He purchased the chief interest in the Philadelphia *Sunday-School Times* in that year and was its editor until his death. He discovered the site of Kadesh-barnea on the southern border of Palestine while on a tour of the East in 1881. His works include: *The Sabbath School Concert* (1861); *The Knightly Soldier* (1865); *Kadesh-barnea* (1884); *Studies in Oriental Social Life* (1894); *War Memories of an Army Chaplain* (1898); *Old Time Student Volunteers* (1902); etc.

TRUMBULL, James Hammond: American philologist, brother of H. C. Trumbull: b. Stonington, Conn., 1821, Dec. 20; d. Hartford, Conn., 1894, Dec. 5. He was educated at Yale, assisted Rev. James H. Linsley in compiling catalogues of the mammalia, reptiles, fishes, and shells of Connecticut in 1842-3, was assistant secretary of the State of Connecticut in 1847-52 and again in 1858-61, and secretary during the Civil war, 1861-5. He was corresponding secretary of the Connecticut Historical Society in 1849-63, and its president in 1863-89. In 1863-91 he was librarian of the Watkinson Library of Reference at Hartford, was an original member of the American Philosophical Society from its organization in 1869, and was its president in 1874-5. He was elected to the National Academy of Sciences in 1872 and was appointed lecturer on the Indian languages of North America at Yale in 1873. He prepared the catalogue of Americana belonging to George Brinley, which added much to his reputation as a bibliographer, and devoted the closing years of his life to the compilation of a dictionary and vocabulary from John Eliot's Indian Bible, which he was reputed to be the only living American able to read. His manuscript was published under the title *Natick Dictionary* (1903). His other works include: *Colonial Records*

of Connecticut (3 vols., 1850-9); *The Best Method of Studying the Indian Languages* (1871); *Historical Notes Names of Places in and on the Borders of Connecticut on the Constitution of Connecticut* (1872); *Indian Names of Places on the Borders of Connecticut with Interpretations* (1881); *Memorial History of Hartford County* (2 vols., 1886); etc.

TRUMBULL, JOHN: American jurist and poet: b. Westbury (now Waterbury), Conn., 1750, Apr. 24; d. Detroit, Mich., 1831, May 10. Graduated at Yale in 1767, he began in 1770 to contribute to the *Connecticut Journal and New Haven Post-Boy* a series of essays called *The Correspondent,* patterned after *The Spectator,* in which he satirized the controversial writers of the time and the American slave-traffic; and published in that year *An Essay on the Use and Advantages of the Fine Arts.* In 1771 he became a tutor in Yale, and began the study of law, which he continued in John Adams' Boston office in 1773, in which year he was admitted to the bar. He practised at New Haven in 1774-6, at Westbury in 1776-81, and from that time at Hartford. In 1789-95 he was State's attorney for Hartford county, in 1792 and 1800 was elected to the legislature, in 1801-7 was judge of the Connecticut Superior Court, and in 1808-19 of the Court of Errors. From 1825 he resided at Detroit. His *Progress of Dulness* (part i. 1772; part ii. 1773) was his first elaborate work in verse. It was a clever satire on the defective culture of contemporary American society, and its epigrammatic ridicule made a great stir. But he is known for *McFingal* (1782), a burlesque epic, in the metre and much in the style of *Hudibras,* which it follows, however, without sacrifice of originality. It admirably developed the humorous characteristics of that disturbed time, and from the first had an unprecedented popularity. Its hero is Squire McFingal, a Scottish-American Tory politician of Massachusetts, with a gift for tedious and inflated speechifying, his Whig opponent, Honorius, seems to be, according to Tyler, a portrait of John Adams. It was the most representative of the distinctly literary productions of the Revolution, to whose movement it greatly contributed. No contemporaneous record presents so well the thought of the period. In pointedness, in ingenuity of rhyme, in the skilful arrangement of its ludicrous narrative, it is admirable. Many extracts such as:

> No man e'er felt the halter draw,
> With good opinion of the law,

passed into the general anthology of quotations. It was reprinted by Lossing, with introduction and notes, in 1857, and another edition of it appeared in 1881. In all, about 40 editions have been circulated in the United States and England. For its full understanding the work now requires some study of the Revolutionary epoch. Trumbull's *Poetical Works* were collected in 1820. Consult the

excellent account in Tyler, *Literary History of the American Revolution* (1897).

TRUMBULL, JOHN: American artist: b. Lebanon, Conn., 1756, June 6; d. New York 1843, Nov. 10. He was graduated at Harvard in 1773; studied painting in Boston; served in the Revolutionary War; and in 1780 went to England to study under West, but was imprisoned on a charge of treason and forced to leave the country. Subsequently he returned to England and became the pupil of West. In 1786 he produced his first historical picture, the *Battle of Bunker Hill;* which was soon followed by the *Death of Montgomery Before Quebec* and *Sortie of the Garrison from Gibraltar.* In 1817 he was employed by Congress to paint four pictures for the rotunda of the Capitol at Washington, namely *The Declaration of Independence,* the *Surrender of Burgoyne,* the *Surrender of Cornwallis,* and the *Resignation of Washington at Annapolis.* He was for many years engaged in finishing his sketches, many of which, together with portraits and copies of old masters, 54 pictures in all, he surrendered to Yale College in consideration of an annuity of $1,000. At the beginning of the 20th century this collection was valued at nearly $100,000. Consult his *Autobiography* (1841).

TRUMBULL, JONATHAN: American patriot: b. Lebanon, Conn., 1710, Oct. 12; d. there 1785, Aug. 17. Graduated from Harvard in 1727, he studied theology and was licensed, but in 1731 left the ministry for the law, was a member of the Assembly in 1733, its speaker in 1739, and deputy-governor in 1767-8. From 1769 until his resignation in 1783 he was governor. During the Revolution he worked with vigor for independence. He is said to have been the original 'Brother Jonathan,' that being Washington's familiar name for him. He was the only colonial governor to take the popular side in the struggle; and when notified by Washington (August 1776) of the inadequacy of the army, called for nine more regiments of 350 each, in addition to the five Connecticut regiments already supplied. These troops arrived at New York just in time to meet the British advance. In 1766-9 Trumbull was also chief justice of the superior court of Connecticut, and as such he has been highly praised by Bancroft. Consult the *Life* by Stuart (1857).

TRUMBULL, JONATHAN: American politician, son of the preceding: b. Lebanon, Conn., 1740, March 26; d. there 1809, Aug. 7, He was graduated from Harvard in 1759, and prior to the Revolution was a member of the Connecticut legislature and speaker of the House. He was paymaster-general in the Continental army, 1775-80, and military secretary to Washington, 1780-3. He sat in Congress 1789-95, being speaker of the House of Representatives 1791-5, was United States senator

1795-6, lieutenant-governor of Connecticut 1796-8, and governor from 1798 till his death.

TRUMBULL, LYMAN: American politician: b. Colchester, Conn., 1813, Oct. 12; d. Chicago, Ill., 1896, June 20. He studied law in Georgia, was admitted to the bar and settled in Belleville, Ill., in 1837. He was secretary of state of Illinois in 1841-2; and justice of the Supreme Court of the State in 1848-53. He was United States senator 1855-73, and although formerly a Democrat, became prominent as a Republican. He secured the passage of the 14th Amendment; and was one of the Republicans who voted against the impeachment of Andrew Johnson. After 1872 he supported the Democratic party.

TRUMP, v. *trŭmp* [It. *trombare,* to make a rattling noise; *strombare,* to blurt with one's mouth: F. *tromper —lit.,* to blow the trumpet to one, hence, to deceive (see TRUMPET)]: in *OE.,* to lie; to boast; to deceive; to impose upon; to play a trick upon. TRUMP'ING, imp. TRUMPED, pp. *trŭmpt.* TRUMPERY, n. *trŭmp'ėr-ĭ,* something of less value than it seems, falsehood; trifles; empty talk; things of no value: ADJ. trifling; worthless; not able to bear investigation. TO TRUMP UP, as a story, to get up a fraudulent story; to devise; to seek and collect apparent evidence unscrupulously, from every quarter.

TRUMP, n. *trŭmp:* in *Scrip.* and *poetry,* a trumpet.

TRUMP, n. *trŭmp* [F. *triomphe;* Ger. *trumpf,* trump: same word as *triumph,* from L. *triumphus,* a triumph]: the suit of cards in a game any one of which for the time being outranks and takes any card of the other suits; the winning card; an old game at cards; in *slang,* a good fellow upon whom one can always depend to do the right thing on an emergency: V. to play a winning card on another in order to win; to take with a winning card. TRUMP'ING, imp. TRUMPED, pp. *trŭmpt.*

TRUMPET, n. *trŭm'pĕt* [F. *trompe* or *trompette:* Sp. and Port. *trompa;* It. *tromba,* a trumpet: OHG. *trumba,* a drum: L. *tuba,* a trumpet with a straight tube]: a wind instr. of great antiquity, in its present form consisting of a tube of considerable length, doubled up in the form of a parabola, and terminating in a bell-like aperture: V. to publish by sound of trumpet; to proclaim. TRUM'PETING, imp. TRUM'PETED, pp. TRUM'PETER, n. *-ėr,* one who or that which trumpets; a soldier who blows a trumpet; to give a signal or pass an order; one who proclaims or publishes; a kind of pigeon. TRUM'PETRY, n. *-rĭ,* the sound or blowing of trumpets. TRUMPET-CALL, a military order sounded through a trumpet. TRUMPET-FISH, a fish so called from its tubular muzzle. TRUMPET-FLOWER, a name applied to more than one species of plants of the ord. *Bignoniăcĕæ,* whose flowers are trumpet-shaped; a species of honeysuckle. TRUMPET-SHELL, a univalvular shell of a trumpet-shape.

TRUMPET-TONGUED, a. having a tongue loud and piercing as a trumpet. SPEAKING-TRUMPET, a trumpet for increasing the intensity of speech, and transmitting it to a considerable distance. HEARING or EAR TRUMPET, a long tube, generally made curved or spiral, with a trumpet-shaped end, for collecting sounds into a focus, used by persons with imperfect hearing, to enable them to hear words and sounds more distinctly.

Music for the Trumpet, as for the Horn (q.v.), is written in the key of C, the key to which the instrument is to be adapted being pointed out by the composer. The pitch is an octave higher than that of the horn. Trumpets in the keys of C, D, and E♭ are most used; but there are trumpets also in A, B♭, E, F, and G. To enable the Trumpet to give a complete series of semitones, finger-keys and sliding tubes have been introduced by some makers, rather to the detriment of the freshness and fulness of tone of the instrument.

TRUMPET-FISH, or SNIPE-FISH, or BEL'LOWS-FISH: fish of the genus *Centriscus*, family *Centriscidæ*, remarkable for the elongated and tubular snout, at the end of which the mouth is situated; and for a very long spine in front of the dorsal fin. The species (*C. scolopax*), rare on Brit. coasts, abundant in the Mediterranean, attains a length of about 5 in., the snout projecting about an inch and a half in front of the eyes. The mouth is destitute of teeth. This little fish is esteemed a delicacy, and is often seen in the markets of Italy.—On the N. Amer. Atlantic coast the name trumpet-fish is given to *Fistularia tabacaria*, of family *Fistulariidæ*—a fish similar in appearance, but having a tail with two long filaments. Another name is Pipe-fish.

TRUMPET-FLOWER: popular name of flowering shrubs of genera *Bignonia* and *Tecoma*, both of the nat. order *Bignoniaceæ* (q.v.). *Bignonia caprcolata* is native of the s. states, but often planted in shrubberies and gardens in the middle states. It is a climbing shrub with conjugate leaves and heart-shaped oblong leaflets. The flowers are reddish yellow, with long tubular corolla, from whose form the Eng. name is derived.—*Tecoma radicans* (formerly *Bignonia radicans*) is a woody vine, native of the s. states, reaching to a more n. latitude than the last. It has much larger flowers, of yellowish-scarlet color. The leaves are pinnate, leaflets ovate and toothed.—*T. grandiflora* is a native of Japan, with pinnate leaves and flowers much larger than *T. radicans*.

TRUMPET SHELL: a large marine gasteropod (*Triton variegatus*) of the South Seas. The shell, which is a foot or more in length, is white mottled in irregular spiral rows with ruddy brown and yellow, deepening into chestnut at the point; interior white; lip with smooth white ridge on a black ground. It is employed by the Australian natives and the South Sea Islanders as a trumpet. To fit the shell for this purpose a round hole is bored at the side, about one-fourth the length from the

tip, and a loud hoarse sound is produced by blowing across the hole, as a performer plays a flute. While blowing, the right hand is placed in the cavity of the shell. The large conch shells of the West Indies are frequently pierced and used for the same purpose.

TRUMPETER: a genus (*Psophia*) of wading-birds, related to the cranes, found in South America, and so named from their hollow cry, which results from the peculiar conformation of the windpipe or trachea. The bill is short and stout, and except for their long legs and necks these birds resemble fowls. The most familiar species is the golden-breasted trumpeter (*P. crepitans*), which is readily tamed, and becomes a favorite inmate of the house. The head and neck are velvety-black; the breast is glossy-green; the back gray; and the wings, tail, and under parts black. This species, like the others, lives in the forests in flocks; and feeds upon fruit, seeds, and insects. They run swiftly but seldom fly. The eggs, numbering 10 or 12, are light-green in color, and are deposited in a mere hole scratched in the ground. Only about five other species are known, all belonging to the single genus and constituting the family *Psophidæ*.

TRUMPETS, Feast of: a Jewish feast on the first day of the 7th month (Tisri), which was to be kept as 'a sabbath, a memorial of blowing of trumpets, an holy convocation.' No servile work was to be done in it; but an offering of fire was to be presented to Jehovah (Lev. xxiii. 23-25). It preceded by 10 days the Great Day of Atonement (27). In Numbers (xxix. 1-6), details are added as to the 'offering of fire,' which was to include the burnt offering, a meat offering, and a sin offering. The first of Tisri was New Year's Day of the civil year. It is still observed as a Jewish festival.

TRUNCATE, a. *trŭng'kāt* [L. *truncātus*, pp. of *truncārĕ*, to maim, to cut off—from *truncus*, a trunk: It. *troncare;* F. *tronquer*, to lop off]: terminating abruptly as if cut off at the end: V. to cut off; to lop; to maim. Trun'cating, imp. Trun'cated, pp. a. cut short; in *geom.*, applied to a pyramid or cone, the top or vertex of which is cut off by a plane parallel to its base. Truncation, n. *trŭng-kā'shŭn*, state of being truncated; the change in the geometrical form of a crystal, produced by the cutting off of an angle or edge so as to leave a face more or less large instead of the edge or angle. Truncus, n. *trŭng'kŭs*, in *bot.*, the trunk or bole of a tree.

TRUNCHEON, n. *trŭn'shŭn* [F. *tronçon*, a piece cut or broken off, as from a lance or sword—from L. *truncus*, stock or trunk of a tree]: a short staff; a cudgel; a baton; a military staff of command: V. to beat with a cudgel. Trun'cheoning, imp. Trun'cheoned, pp. *-shŭnd:* Adj. furnished with a truncheon. Trun'cheoneer', n. *-shŭn-ēr'*, or Trun'cheoner, n. *-shŭn-ėr*, a person armed with a truncheon.

TRUNDLE, v. *trŭn'dl* [AS. *trendel*, an orb, a circle: Fris. *trund*, round: Sw. and Dan. *trind*, round: from same

root as *trend*]: to roll along; to roll, as on little wheels; to roll along, as a hoop: N. a round rolling body; a little wheel; a low cart with small wooden wheels—now called a *truck*. TRUN'DLING, imp. *-dlĭng*. TRUNDLED, pp. *trŭn'dld*. TRUNDLE-BED, same as TRUCKLE-BED, which see under TRUCKLE. TRUNDLE-HEAD, the wheel that turns a millstone. TRUNDLE-TAIL, a round tail of a dog; a dog having such a tail.

TRUNK, n. *trŭngk* [F. *tronc*, a trunk, headless body, alms-box—from L. *truncus*, the stock or body of a tree without the boughs: Ger. *strunk*, a stump, a trunk]: the stem or body of a tree apart from its branches; the main body of anything; a box or chest, particularly one covered with leather, skin, or the like; the proboscis of an elephant; the part of the body between the head and the abdomen; a large pipe through the cylinder of a steam-engine; a water-course made of planks. TRUNKS, n. plu. *trŭngkz*, trunk-hose. TRUNKED, a. *trŭngkt*, having a trunk. TRUNK ENGINE, an interesting though practically obsolete form of marine engine formerly used on war vessels. The aim of its design is compactness of arrangement, so as to place all of its working parts below the waterline, thus protecting them from the enemy's shot. Its distinguishing feature is a hollow, trunk-shaped piston rod which passes through both ends of the cylinder and is encircled in the middle by the piston head. The connecting rod is attached to the interior of the piston rod, thus saving the length of the piston rod in all of the vertical dimensions of the engine. Its chief defect consists in its low steam economy, due to the great loss of heat by radiation from the large conducting surfaces of the hollow piston rod which are exposed to the air. TRUNK-HOSE, that part of hose which covered the trunk or body; hence a garment covering the body from the waist to the middle of the thigh, and shaped like a bag through which the legs are thrust. TRUNK-LINE, the main line of a railway, as distinguished from the branch lines or feeders. TRUNK VALVE, an antiquated form of D slide valve; obsolete. ELEPHANT'S TRUNK, the proboscis of the elephant, perhaps a corruption of *trump*, in allusion to its long trumpet-like form.

TRUNK-FISH: a variety of fish of the order *Plectognathi* and the sub-order *Ostracodermi*. See OSTRACION.

TRUNK-HOSE: a kind of short wide breeches gathered in above the knees, or immediately under them, and distinguished according to their peculiar cut as French, Gallic, or Venetian. This garment prevailed during the time of Henry VIII., Elizabeth, and James I.

TRUNNION, n. *trŭn'yŭn* [F. *trognon*, the stalk of a cabbage: It. *troncone*, the trunk or body of a tree—from L. *truncus*, a trunk]: one of the two knobs which project from the opposite sides of a cannon, and which serve to support it on the cheeks of the carriage (see GUN).

TRURO, *trū'rō:* town, county-seat of Colchester co., Nova Scotia; near the head of Cobequid Bay; on the Intercolonial railroad, at its junction with the Pictou branch; 61 m. n.n.e. of Halifax. Besides several handsome churches, its public buildings are the court-house, a provincial normal school, and the model school buildings. Truro manufactures engines, machinery, iron-castings, woolens, leather, woodenware, boots and shoes, hats, lasts, and pegs. Mining, ship-building, and fishing are carried on in its vicinity.—Pop. (1901) 5,993.

TRU'RO: city, municipal borough, and seaport of Cornwall, England, of which county it is considered the metropolis, though Bodmin is the county town; about 10 m. n.n.e. of Falmouth, 300 m. by railway s.w. of London; at the junction of the Allen and the Kenwyn, here met by an inlet of the sea called Truro river, whose banks present some beautiful scenery, and which admits vessels of 70 tons to the quays of the town. Truro is one of the oldest towns in England. It is the centre of a mining district, and largely exports tin and copper ore. St. Mary's Church, an interesting Perpendicular Gothic edifice of the 16th century, has in part been incorporated with the new Cathedral of St. Mary (1880), which forms one of the most important of modern English ecclesiastical buildings. The bishopric of Truro was constituted 1876.—Pop. 12,000.

TRURO, Thomas Wilde, Baron: English statesman: b. London 1782, July 7; d. there 1855, Nov. 11. He was educated at Saint Paul's School, studied law, and in 1817 was called to the bar. He was retained for the defense of Queen Caroline in 1820 and made himself famous by his conduct of the case. He entered Parliament in 1831, sitting for Newark-on-Trent, and continued to hold that seat until 1841, with the exception of the years 1832-5. He subsequently represented Worcester until 1850 when he took his place in the House of Lords. He was appointed solicitor-general in 1839, and attorney-general in 1841, though he occupied the latter office but a few months. He introduced Rowland Hill's postal reform plan to the House in 1843, and in 1846 was reappointed attorney-general by Lord Russell, an office which he vacated a few days later to become chief justice of the court of common pleas. He was sworn as lord-chancellor in 1850, and at the same time created Baron Truro. His career as chancellor was eminently successful, a fitting conclusion to his long and honorable career.

TRUS'DELL, Charles Gregory: American philanthropist: b. Montgomery, N. Y., 1826, May 1; d. Chicago, Ill., 1903, Feb. 16. He received an academic education, studied theology, and in 1857 was ordained in the Methodist ministry. He held various charges in Iowa until 1865, in which year he became presiding elder of the Iowa City district. He subsequently accepted the pastorate of a church in Chicago and preached there until

the fire of 1871 when he was appointed to superintend the distribution of the relief fund. In this capacity he expended nearly $5,000,000 for the relief of the fire sufferers. The Relief and Aid Society was continued afterward for the benefit of the Chicago poor and Trusdell remained superintendent until his death. He was appointed presiding elder of Chicago in 1885.

TRUSS, n. *trŭs* [F. *trousser*, to pluck up; *trousse*, a truss, a bundle: OF. *trosser, torser*, to pack up—from a supposed mid. L. *tortiārĕ*, to twist together—from L. *tortus*, pp. of *torquērĕ*, to twist: O.Sp. *trossa;* Sp. *torca*, a truss of hay: W. *torchi*, to twist, to wreathe]: a quantity, about 56 lbs., as of hay or straw, tied together; a small hand-packed bundle of dry-goods: in *building*, a combination of timbers or of iron parts, or both, so arranged and fastened together as to form a stiff unyielding frame; in *surg.*, a bandage or apparatus used in cases of hernia to keep up the reduced parts, and to prevent further protrusion (see below): among *seamen*, the rope used to keep the centre of a yard to the mast, now replaced by a heavy iron fitting; in *arch.* (see CONSOLE): V. to bind or pack close; to skewer, as poultry, etc.; to make fast; to hang. TRUSS'ING, imp.: N. the act of packing or binding closely; the collection of timbers which bind and support a roof or beam. TRUSSED, pp. *trŭst.* TO TRUSS UP, to make close or tight; to hang.

TRUSS: instrument employed in the palliative treatment of Hernia, with the view of preventing its descent, and, in some cases, of effecting a permanent cure. It consists essentially of a pad or cushion attached to a metallic spring, with straps so arranged that its position may be retained during the varied postures of the body. The necessity of having recourse to a suitable truss the moment that the slightest protrusion shows itself in any of the parts liable to hernia cannot be too strongly urged. At whatever period of life a hernia occurs, if properly attended to, and judiciously supported, it usually gives little trouble, and in early life it may often be cured; whereas, if neglected, increase of bulk, and, later, strangulation, often terminating in death, will almost certainly occur. A surgeon should always be consulted in the choice of the instrument. There are occasional cases in which the common truss fails to support a rupture comfortably; in these cases special forms of instruments may be found necessary. The patient must expect to find the truss somewhat uncomfortable for a week or two, but will soon become used to it. The skin of the part on which it presses should be regularly washed and bathed with Eau de Cologne or spirit, to harden it.

TRUST, n. *trŭst* [Icel. *traustr*, trusty: Norw. *traust*, firm, steady: Dan. and Sw. *tröst*, consolation: Goth. *triggws*, faithful; *trausti*, a covenant: Ger. *trost*, help, protection (see TRUE)]: a resting of the mind on the in-

tegrity, justice, or friendship of another; reliance; confidence; the person or thing that is the ground of confidence; credit given without examination, or without security of any kind; that which has been given or received in confidence; something committed to charge of which an account must be given; confidence in supposed honesty; credit given on a promise of payment; in *law*, a confidence reposed in a person by making him the nominal owner of property which he is to hold or use for the benefit of another, or the estate so held (see below): V. to rely on; to believe; to credit; to venture confidently; to commit to the care of in confidence; to hope, as 'I *trust* he will do well'; to be confident of something future; to sell to upon credit; to confide or have confidence in; to be won to confidence. TRUST'ING, imp.: ADJ. confiding. TRUST'ED, pp. TRUST'ER, n. *-ẽr*, one who trusts. TRUST'INGLY, ad. *-lĭ*. TRUSTEE, n. *trŭs-tē'*, person who holds an estate or property of any kind for the benefit and use of another (see TRUST, below). TRUSTEE'SHIP, n. *-shĭp*, the office of a trustee. TRUSTEE-PROCESS, term, in some New England states, for GARNISHMENT (see GARNISH, etc.). TRUST'FUL, a. *-fûl*, full of trust; worthy of trust; faithful. TRUST'FULLY, ad. *-lĭ*. TRUST'FULNESS, n. quality of being trustful. TRUST'LESS, ad. not worthy of trust. TRUST'LESSNESS, n. *-nĕs*, the state or quality of being trustless. TRUSTY, a. *trŭs'tĭ*, that may be safely confided in or trusted; honest; faithful; that will not fail; firm; strong. TRUST'ILY, ad. *-lĭ*. TRUST'INESS, n. *-nĕs*, the quality of being trusty; fidelity; honesty. TRUST'WORTHY, a. worthy of trust or confidence; faithful; honest. TRUST'WORTHINESS, the state or quality of being trustworthy. TO TRUST IN, to place confidence in; to rely on. TO TRUST TO, to depend on; to rely on. TRUST-DEED, a deed creating a trust; specifically, in *Scots law*, legal document in which the property is conveyed or made over to a person or persons called *trustees* for a specific object, e.g., payment of the debts of the truster. TRUST ESTATE, the property conveyed by trust-deed.—SYN. of 'trust, n.': faith; hope; dependence; reliance; belief; expectation; credit; deposit.

TRUST, in Law: a right of property, real or personal, confided to one person (*trustee*), to be by him held for the benefit of another person (*Cestui que trust*—q.v.—or *beneficiary*). The enforcement of the terms of a trust, as also the providing a new trustee instead of one deceased or refusing to accept the trust, are matters for a court of chancery or similar court. A trust means a species of divided proprietorship, whereby the trustee acts as a custodier or strong-box, and yet the benefit of the property is not his, but belongs to the *cestui que trust*. The person who creates the trust is called sometimes the *celui que trust*. As a general rule, all property, real or personal, may be made the subject of a trust, provided some policy of the law or statute does not prevent it.

Trusts are most frequently created by a will; but they may be declared by word of mouth as regards personalty; while as to land, some writing is necessary. No particular words are necessary, but the intention of the party making the trust must be clear. Thus, in wills, a testator sometimes uses words which do not amount to an express trust, but speaks of his 'wish and desire,' or his 'confidence,' that the executor or trustee shall do certain things. These words are called in the law precatory trusts, but are enforced in the same way as those in more direct language, if no uncertainty exists as to the purposes or mode of carrying out the trust. But if a testator merely recommends an executor to 'consider certain persons,' 'to be kind to them,' or 'to do justice to them,' or 'to make ample provision for them,' etc.—such expressions are treated as too vague to be binding; therefore the executor may disregard them, or use his own discretion. A trustee's office is not compulsory, but gratuitous; therefore he need not accept the office unless he pleases. But if he once accept, he is not at liberty afterward to renounce, unless the trust-deed contain a provision enabling him to do so, or the court of chancery for good reasons discharge him. A trustee cannot delegate the office to a third person, but continues personally bound to do his duty. Where there are several trustees appointed, the office is considered joint, so that, if one dies, the survivors continue to exercise the office. As a general rule, all must join in doing any act: but if the trust is of a public nature, a majority may bind the minority. Each trustee is liable only for his own acts or defaults; and this is so even though, for form's saks, he join his co-trustees in signing a receipt, if he can show that he never received the money in point of fact. Nevertheless, when money lies in the hands of one trustee, the others ought not to be satisfied with his mere statement that the money has been invested by him, but should see that the investment has been or is actually made. Another rule is, that a trustee is not allowed to make a gain of his office; and so jealous is an English court of this rule, that the trustees of a large estate are not allowed even to sport over the estate—at least so as thereby to keep any valuable right of that kind for their own pleasure. Hence, a trustee is personally liable if he trade with the trust funds, or buy shares in a joint-stock bank; for even though the trust-deed authorize this to be done, he will be liable to pay the debts of the trading concern, though far exceeding the amount of the trust funds. The duty of a trustee, expressed in general terms, is 'to protect and preserve the trust property, and to see that it is employed solely for the benefit' of the beneficiary. The quality and the duration of the estate of a trustee are to be determined by the purpose and exigency of the trust; hence, if the instrument creating the trust declares that the estate goes to the trustee and his heirs, the term of the trust may be shortened if thereby the purposes of the

creation of the trust are attained. A trustee can be sued for any breach of trust, and must make good losses caused to the trust estate by his negligence.

The Trust Defined.—What is a trust? To quote the words of S. C. T. Dodd, solicitor of the Standard Oil Company, who, as a student of and acknowledged authority on the characteristics of the modern trust movement, never shuffled in his definitions or hesitated in his logic, we find that 'The term "trust" in its more confined sense embraces only a peculiar form of business association effected by stockholders of different corporations transferring their stocks to trustees. The Standard Oil Trust was formed in this way, and originated the name "trust," as applied to associations. . . . The term "trust," although derived as stated, has (now) obtained a wider signification, and embraces every act, agreement, or combination of persons or capital believed to be done, made, or formed with the intent, power, or tendency to monopolize business, to restrain or interfere with competitive trade, or to fix, influence, or increase the prices of commodities.' Thus not only are consolidations of former competing plants to be looked upon as trusts, but all large businesses which possess or are believed to possess the foregoing characteristics are trusts, whether made up of one plant or a hundred, and whether actually possessing monopolistic features or not. Thus, franchise corporations and groups are trusts; railroad aggregations are trusts; possessors of exclusive powers or privileges of any sort, as well as mere producers on a large scale, must be looked upon as trusts. If there is any qualification at all in the public mind as to the correctness of the above definition, it is merely that the thoroughgoing trust must be characterized by largeness. Very small corporations, even if they possess monopolies, are not popularly called trusts.

The Trust and Monopoly.—The word 'trust' is necessarily closely allied with the term 'monopoly.' Everywhere are discussed together the evils of trusts and monopolies. Almost universally the term is used in an opprobrious sense, and in the popular mind the terms have various interchangeable meanings, such as 'predatory wealth,' 'money-power,' etc. The public has become largely imbued with the belief that a monopoly is a menace to their general welfare, and this idea has, of course, been persistently kept to the front by a large element of writers and thinkers. On the other hand, a more conservative element; and particularly those known as the 'capitalist class,' persistently insist that there is no such thing as monopoly in modern industrial and commercial life, except in a very limited way. For instance, it is claimed that while patents may be monopolies in a qualified sense, yet, in view of the fact that the granting of a patent confers a benefit on the community, it should therefore be accorded a definition which is not so universally unpopular and 'vicious' in its

meaning. Monopoly is not combination itself; the monopoly element, where there is any, is something distinct from the mere organization or trust. When men form corporate organizations or make agreements they do not form monopolies. They may take advantage of monopoly in one way or another, but they do not create it. The monopoly itself is rather a social product, which exists with the consent of society, and men in business take advantage of it where found, just as they take advantage of any other factors for the purpose of achieving their ends. For example, it is first found that in the production of steel rails, better results can be obtained by purchasing raw material in enormous quantities, even at the risk of tying up much capital; and later, it is proven to be still more economical and advantageous in the long run to actually own the raw materials, even to the ore in the mountainside; and so the same tendency continues until the most profitable condition is reached, when the great aggregate of all producers combine in harmony and absorb all the raw materials or sources of supply, with which they may almost exclusively supply the entire market with the finished product. Thus we see here illustrated a condition of society which men take advantage of to their direct benefit. In the absorption and exclusive possession of the source of supply is the securing of the monopoly. Without the possession of this source of supply the steel industry would have no permanent monopoly, for an effective use of monopoly consists in practically the exclusive use or possession of it. Examined in this way it will be found that, while all large businesses are not necessarily monopolies, yet the element of monopoly is frequently an important feature in a large business or industrial enterprise, and is often one of the chief factors making for stability and success. A monopoly, then, is a special advantage or privilege either natural or artificial. Governments confer monopoly-power, but society itself creates monopoly. Even government itself, a creation of society, may in a sense be called a monopoly. Patents, copyrights, franchises, tariff benefits, the privilege of holding land out of use and all like benefits are governmentally conferred monopoly-powers; rights of way of transportation companies, terminal sites and coal, iron and other ore deposits are socially created or natural monopolies. Monopoly is a fundamental and universal factor in modern life, but seems to be little understood, hence the agitation against it is frequently characterized by unfairness and superficiality. Men rail against a vague thing which they call 'monopoly,' and yet they do not usually know the real signification or meaning of the term. For it is a fact that the mass of mankind are monopoly-seekers in one form or another; they are all seeking for benefits or advantages. Men naturally seek to gratify their desires with the minimum of effort, and

when they can make any sort of a 'short-cut,' they generally do it. This is one of the fundamental tendencies of civilization, and any sentiment or agitation which does not reckon with this natural tendency will prove both futile and ineffective. Such laws as the Sherman anti-trust act prove little more than toys in the face of these natural tendencies; a fact which is proven by the experience of our anti-trust legislation of the past twenty years. Almost everywhere in trust circles it is pointed out that success in modern business involves these 'short-cuts.' And this claim certainly seems to be verified very strongly in the modern trust movement, which has been so largely a result of the desire and necessity to eliminate waste and to economize in the securing of results. These so-called 'short-cuts' in business methods are made in many ways, and men are constantly breaking through the lines of abstract justice to achieve their ends. Where they do this, society often appears to endorse these methods on the general theory that the end justifies the means.

Magnitude of the Trusts.—In the matter of capitalization the greater industrial trusts of the United States, of which there are at the present time (1909) seven, are represented by an aggregate of outstanding stocks and bonds (par value) which reaches no less a total than $2,662,752,100. Of this amount, over one half, or $1,370,000,000, is included in the capitalization of the United States Steel Corporation and its subsidiary companies. These greater industrial trusts have all been organized since 1898, with one exception (the sugar trust), and all are incorporated under New Jersey laws. They represent an aggregate consolidation of over 1,500 distinct plants. Of the lesser industrial trusts, there are in active existence 298, with a total par value capitalization of $4,055,039,433. These 298 trusts represent consolidations of over 3,400 original plants. Adding various reorganized trusts, the aggregate capitalization outstanding in the hands of the public of 318 important and active industrial trusts in this country is at the present time no less than $7,246,342,533, representing in all, consolidations of nearly 5,300 distinct plants, and covering practically every line of productive industry in the United States.

The Chief Characteristic of the Trusts.—To view the immense aggregation of over $20,000,000,000 of consolidated capitalization is to at once raise in the mind the all-important problem as to what is the underlying cause of this seemingly irresistible tendency toward business centralization. For there must clearly be such a cause, and a deep-lying one. For many years, so-called authorities have been busily creating and applying remedies for the speedy removal of the trusts. And still the trust movement has seemed all the time to plunge forward with accelerated speed, and there appears to be

little in sight as yet to frustrate it in the slightest degree. In spite of all this babel of discussion accusation and crimination, the writer believes that the trust-doctors and 'trust-busters' are for the most part as far from the real cause and real remedy as daylight is from darkness. Instead of the growth of the trust movement being an achievement to be laid at the door of Mr. Morgan or Mr. Rockefeller, or any other leader of men, it should be laid at the door of nature. For if anything in this world is true, the following proposition is:

The modern trust is the natural outcome of evolution of social conditions and ethical standards which are recognized and established among men today as being necessary elements in the development of civilization. The above definition does not necessarily imply, however, that social conditions or ethical standards are entirely what they should be. The ethical standards which appear to justify certain features of the trust movement may be false; and insofar as they have contributed any vicious or unjust characteristics to the working of the trust tendency, they certainly are false. Now, while all successful trusts are not monopolies, all successful and permanent ones which are capitalized on anything but a free-competitive basis, do at least embrace elements of monopoly. For monopoly is one of the necessary assets in modern methods of financing; it is an element that reaches far down and makes its influence felt in every walk of life, and is, if not directly, at least indirectly, one of the great factors which makes for concentration throughout all civilized society. Coincident with the active working of this new element in our modern life, concentrated industry grew with great rapidity; commerce took on greater strides; great enterprises controlled by greater minds came into being; wealth grew with wonderful rapidity, and instead of being distributed as before, began to be put to use under the method of concentrated capital, and through the effective and concentrated control of the master minds at the head of the gigantic industries, a point has been finally reached where wealth today is accumulated and massed with greater aggregate result than ever before in the history of mankind. And this condition has been largely brought about by the existence of monopoly power. As before stated, this monopoly element is not merely the product of a tariff or of other so-called 'class legislation.' It is far more fundamental than that. While it is true that patents are monopolies, and the protection of an industry by a tariff fosters a monopoly, so also is a railway or gas franchise a monopoly; railroad terminals and rights of way are monopolies; building sites are monopolies; the national banking law creates a monopoly; exclusive grants of land and steamship subsidies are monopolies. The fact is, we find the element of monopoly all about us, and how modern civilization is going to get away

from it or even retrench it by the passage of ineffective laws is, in the light of the foregoing facts, an exceedingly intricate question. The anti-trust legislation which has thus far been tried or broached in this country would appear to be singularly inefficient and beside the point. It does not seem to be in any sense in conformity to the spirit of modern tendencies and conditions. It aims merely to prick the pimples of the social problem rather than to go to the root of things. For when we realize what monopoly is, its depth and width and general position in modern industrial and commercial life, we can readily see that any kind of legislation aiming to abolish or materially retrench monopoly would have to be far-reaching and radical in its effects and would constitute a practical revolution in the bases of modern society. Whether one may regard monopoly as a curse or a blessing it is too deeply rooted in civilized society to be whisked away with a broom. The solution of the trust question really embraces, however, nearly the whole problem of modern industrial society. And in treating this problem from the point of view of not one interest nor one class of citizens, in viewing it from the standpoint of the ordinary citizen as well as from that of the capitalist and investor, we must necessarily bear in mind two fundamental facts. The first of these facts is that large-scale and economic production is the outcome of a natural evolution and has undoubtedly come to stay. The other fact is that concentration and exclusive financial control are chiefly the result of monopolistic conditions which are themselves an evolution from customs and ethical standards which, whether true or false, have for a long time been regarded as justifiable or necessary by an apparent majority of our citizens. That the evils of the trust and of monopoly are many, goes without saying, and the solution of the problem is a most serious one; but whatever steps men may take to counteract these evils, it should never be forgotten that the chief considerations are the preservation of equal individual liberty, and the free working of natural economic laws.

Consult: Bemis, *Municipal Monopolies* (1899); Bridge, *Inside History of the Carnegie Steel Company* (1903); Brooks, *The Social Unrest* (1903); Chicago Conference on Trusts, *Complete Report* (1900); Clark, *Control of Trusts* (1901); Collier, *The Trusts* (1900); Dodd, *Combinations, their Uses and Abuses* (1894); *Trusts* (1900); Dos Passos, *Commercial Trusts* (1901); Ely, *Monopolies and Trusts* (1900); Hadley, *Railroad Transportation* (1885); Hobson, *Evolution of Modern Capitalism* (1894); *Inside View of Trusts* (1900); Inter-state Commerce Commission, *Annual Reports* (1887-8); Jenks, *The Trust Problem* (1900); Lloyd, *Wealth against Commonwealth* (1894); Meade, *Trust Finance* (1903); Meyer, *Railway Legislation in the United States* (1902); Montague, *Rise and Progress of the Standard Oil Com-*

pany (1903); *Trusts of Today* (1904); Moody, *The Truth about the Trusts* (1904); Parsons, *The City for the People* (1901); Stickney, *State Control of Trade and Commerce* (1898); Tarbell, *History of the Standard Oil Company* (*McClure's Magazine*, 1904); *The Trust, its Book* (1902); United States Industrial Commission, *Report* (1900-2); Von Halle, *Trusts or Industrial Combinations and Coalitions in the United States* (1895).

TRUTH, n. *trôth* [see TRUE]: conformity to fact or reality; freedom from falsehood; fidelity; constancy; sincerity; honesty; virtue; that which is true; a fixed principle or proposition: V. in *OE.*, to affirm as true. TRUTH'FUL, a. *-fûl*, habitually disposed to speak truth; closely adhering to truth. TRUTH'FULLY, ad. *-lĭ*. TRUTH'FULNESS, n. *-nĕs*, the state of being truthful. TRUTH'LESSNESS, n. *-nĕs*, the state of being truthless. IN TRUTH, in reality; in fact. OF A TRUTH, in reality; certainly. FIRST TRUTHS, intuitive matters of belief. TRUTH-SPEAKING, a. uttering truth.

TRUTH, SOJOURNER: American negro lecturer: b. Ulster co., New York, about 1775; d. Battle Creek, Mich., 1833, Nov. 26. She was held in slavery even after its abolition in the state. In 1827 she escaped, discarded the slave name Isabella, and chose the above fanciful appellation—Truth—as the substance of her message, and Sojourner because it was divinely revealed. Though quite illiterate, she spoke with some effect on emancipation and other reforms. Consult: *The Narrative of Sojourner Truth* (1884).

TRUXIL'LO: town of Peru, cap. of the prov. of Libertad; near sea coast, about 300 m. n.n.w. of Callao. The port of Truxillo is Huanchaco, about 8 or 9 m. n.w., from which considerable quantities of rice and spices are exported. Truxillo was founded 1535 by Pizarro, who named it after his birthplace in Spain. It is the seat of a bishop; has a so-called univ. and an episcopal seminary. —Pop. 11,000.

TRUXIL'LO, or TRUJIL'LO: town of Spain, prov. of Cáceres; on the great highway from Madrid to Badajoz; birthplace and burial-place of Pizarro (q.v.). The people are engaged in weaving, tanning, pottery-making, etc.; and there is profitable trade in cattle. Truxillo has five churches, eight convents, four hospitals, and several palaces.—Pop. 10,000.

TRUXTUN, *trŭks'tŭn*, THOMAS: naval officer: 1755, Feb. 15—1822, May 5; b. on Long Island, N. Y. He became a seafarer at the age of 12. At the outbreak of the revolutionary war he became lieut. on board the *Congress*, privateer; later, as commander of other privateers, he performed many brilliant feats and took as prizes many British vessels. Commanding the U. S. frigate *Constellation*, 38 guns, he captured the French frigate *L'Insurgente*, 40, off Hen's Island, W. Indies,

the loss of the French being 29 killed, 44 wounded; Truxtun's loss, 1 killed, 2 wounded (1799, Feb. 8). In an action with the French frigate *La Vengeance*, 54 guns, off Guadeloupe, Truxtun's vessel lost 14 killed, 25 wounded; the French loss was 50 killed, 110 wounded. *La Vengeance* surrendered, but escaped actual capture, the vessels being separated by a squall (1800, Jan.). Truxtun was appointed to command a squadron destined for Tripoli 1802; but his request for a capt. to command the flagship having been denied, he wrote to the sec. of the navy a letter which was construed as a tender of resignation, and Truxtun was obliged to quit the service.—Truxtun wrote *Remarks, Instructions, and Examples relating to Latitude and Longitude* (1794).

TRY, v. *trī* [F. *trier*, to pick, to select: It. *tritare*, to grind, to sort or sift—from mid. L. *tritārĕ*, to triturate—from L. *trītus*, pp. of *terĕrĕ*, to bruise, to grind: Piedm. *trié*, to grind or wear down]: to attempt; to endeavor; to make or use exertion in order to perform; to make experiment on; to use means; to prove by experiment; to act as a test; to bring to a test; to examine; to bring before a tribunal or into a court of law; to examine judicially by witnesses; to strain, as one's eyes; to purify or refine: N. an attempt; an experiment. TRY'ING, imp.: ADJ. acting as a test, as one's patience or principles; severe: N. a testing. TRIED, pp. *trīd:* ADJ. examined by test. TRIER, TRIABLE, TRIAL: see these titles in alphabetical order. TO TRY BACK, to return on one's track, to gain something lost. TO TRY ON, to fit on an article of dress; *familiarly*, to attempt, usually in phrase, 'to *try* it *on*.' TRY COCKS, cocks inserted in the shell of a boiler at extreme high and low water marks. The upper one is the steam cock and the lower one the water cock. They are used for checking the water gauge in case it chokes up or ceases to act. TRY-SAIL, among *seamen*, a fore-and-aft sail set with a gaff, and with or without a boom, on the lower masts of square-rigged vessels. It is similar to the spencer of brigs or schooners, and to the spanker or driver of ships; and is hoisted on the main or fore mast as an extra sail, to take advantage of a favorable breeze. Sometimes a special mast, called a *try-sail mast*, is erected immediately abaft the mainmast, to hoist it upon. A try-sail is also used without the boom, especially by small vessels, instead of their mainsail during foul weather: in this case it is called a *storm try-sail*. TRYING-HOUSE, the place where whale's blubber is reduced to oil and refined. TRYING-UP, the straight and accurate planing of wooden surfaces, out of winding and at right angles with each other. SYN of 'try, v.': to strive; aim; assay.

TRY'GON. See STING RAY.

TRYMA, n. *trī'mă* [Gr. *trūma*, a hole, an opening]: in *bot.*, a fruit resembling a drupe, as the walnut, having a coriaceous or fleshy epicarp and mesocarp, one-celled and

one-seeded; a two-valved bony endocarp, having partitions on the inner concave surface, as the walnut.

TRYON, *trī'on*, WILLIAM, LL.B.: about 1725-1788, Feb. 27; b. Ireland: milit. officer. He served in the Brit. army in early life; was lieut.gov. of N. C. 1764-5, and gov. 1765-71, and gov. of N. Y. 1771-78, at the period of the outbreak of the revolution. He returned to England 1778; was promoted col. 1772, maj.gen. 1777, and lieut.-gen. 1783. He received his degree from King's College, New York, 1774. His administrations were noted for the extreme cruelty with which he treated the colonial patriots, and for the wanton destruction of Danbury, Fairfield, and Norwalk, Conn., by personally conducted expeditions from New York.

TRYST, n. *trīst* or *trĭst* [a variant of TRUST, which see]: an appointment to meet; an appointed place of meeting; an appointed market: V. to agree to meet; to engage a person to meet one at a particular time or place. TRYST'ING, imp.: N. an appointment. TRYST'ED, pp. TRYST'ER, n. *-ėr*, one who trysts. TRYSTING-DAY, an arranged day of meeting or assembling. TRYSTING-PLACE, a place designated for a meeting or for an interview; a rendezvous.

TSAR, n. *zâr*. See CZAR. TSARINA, n. *zâr-ē'nă*, or, and more correctly, TSARITSA, n. *zâr-ĭt'să*, the empress of Russia.

TSARSKOE SELO, *tsârs'kō-ā sā'lō* ('Imperial Town'): town of Russia, province of St. Petersburg; 13 m. s. of St. Petersburg. It is the royal residence and favorite resort of the imperial family. The carriage-road from the cap. to Tsarskoe Selo was constructed by Empress Catherine II. at a cost of 1,000,000 rubles; but the *route* now preferred is that of the railroad—the first laid down in Russia. The façade of the great palace of Tsarskoe Selo is 780 ft. long. Originally every statue, pedestal, and capital of the columns, vases, etc., were covered with gold leaf; only the dome and cupolas of the church are now gilded. The interior of the chapel is lavishly gilded, the ceiling being one sheet of gold. In the palace grounds, 18 m. in circumference, are an arsenal, with a fine collection of armor, weapons, and accouterments of all kinds, and several curious ornamental buildings, statues, artificial ruins, grottoes, lakes, waterfalls, etc.—Pop. 14,603.

TSCHUDI, *tshô'dē*, or SHUDY: ancient and noble family of Switzerland, distinguished as authors, statesmen, and warriors. The two following are most notable.

GILLES or ÆGIDIUS T.: 'Father of Swiss History:' 1505—1572, Feb. 28; b. in Glarus. He studied at Basel, Vienna, and Paris, and travelled in Switzerland and Italy. On his return he took an active part on the Rom. Cath. side during the struggles of the Reformation in Switzerland, and in consequence was forced for a time

to leave his native canton (1562). Two years later he was permitted to return. He was a prolific writer, not less than 166 works of his (in print or in MS.) being known. The most valuable is a *History of Switzerland* (Basel 2 vols. 1734).—See Fuchs's *Ægid. Tschudi's Leben und Schriften* (2 vols. St. Gall 1805).

JOHANN JAKOB VON T.: eminent traveller and naturalist: b. at Glarus, 1818, July 25. After completing his studies at Leyden and Paris, he undertook (1838) a voyage round the world; but circumstances restricted his design to an investigation into the nat. history and ethnology of Peru, where he remained five years. He was Swiss ambassador at Vienna 1866-83. Tschudi's principal works are: *Peru: Reiseskizzen aus den Jahren* 1838-42 (2 vols. St. Gall 1846); *Untersuchungen über die Fauna Peruana* (St. Gall 1844-47, 76 plates); the splendid work *Antiguedades Peruanas* (Vien. 1851), executed in conjunction with Don Mariano Eduardo de Rivera (Eng. transl. 1845); *Die Kechuasprache* (2 vols. Vien. 1853), containing a grammar and dictionary of the Peruvian language; and *Reisen durch Südamerika* (5 vols. 1866-69).

TSENG (or TSUNG), KI-TSEH, *kē-tsĕh tsŭng*, Marquis: eminent Chinese statesman and diplomat, fellow of the Hanlin College: 1839, Dec. 7—1890, Apr. 12; b. prov. Hûnan, central China. Tsêng was the eldest son of the late grand sec. Tsêng-Kwo-Fan, from whom he inherited the title *How* (2d order of nobility), commonly rendered 'Marquis.' His father had received this title as a reward for his services as chief in command in suppressing the Tae-ping rebellion. When less than a year old, Tsêng's father removed to Peking, and there Tsêng received his education. He accompanied his father through all his operations against the Tae-pings, acting as his sec. for 12 years. In 1870 he had audience of the emperor, and was appointed an official of the fifth rank. His father died 1872, and, according to Chinese custom, Tsêng was compelled to retire for 27 months (the usual period of mourning), during which he studied English. On his way back to Peking, he was hurriedly recalled by news of the death of his mother. This necessitated a further period of retirement, also devoted to English. His mourning over, at last he arrived at Peking, 1877, Aug., and had audience of the emperor; and in the following year was appointed minister plenipotentiary to France and Great Britain, arriving in London 1879, Jan. 1. In 1880, Mar., he was made ambassador and instructed to open negotiations for settlement of difficulties arising out of the rejection by China of the treaty of Livadia, in regard to the retrocession of Kuldja. The treaty concluded by Tsêng was ratified 1881. His settlement of the Tonquin difficulty showed diplomatic ability of the highest order. Returning to Peking 1886, he was made a sec. of the Tsûng-li-Yamen, or bureau of foreign affairs, and

pres. of the board of admiralty, a new department consequent on the separation of naval affairs from the war dept. Tsêng died at Peking, and was buried with great state in Hûnan.

TSETSE, *tsĕt'sē:* dipterous insect (*Glossinia morsitans*), a terrible pest of parts of s. Africa. It is not much larger than the common house-fly, of brown color, with four yellow bars across the abdomen. The wings project considerably beyond the abdomen. It is remarkably alert, at least during the heat of the day, and dexterously avoids any attempt to catch it with the hand. 'Its peculiar buzz,' Livingstone says, 'can never be forgotten by the traveller whose means of locomotion are domestic animals.' Its bite is almost certain death to the ox, horse, and dog. Livingstone, in one of his journeys, lost 43 oxen by it. Yet the bite is harmless to man, to the mule, the ass, and apparently to antelopes and the other wild animals of the country. The proboscis is adapted for piercing the skin, and the fly lives by sucking blood. At first no effect is perceived; but in a few days after an ox has been bitten, the eyes and nose begin to run, 'the coat stares as if the animal were cold,' a swelling appears under the jaw and sometimes at the navel, emaciation and flaccidity of the muscles ensue, purging, sometimes staggering and madness, finally death. On dissection, the cellular tissue under the skin is found injected with air, as if a quantity of soap-bubbles were scattered over it.—Livingstone's *Travels.*

TSIMSHIAN, ('people'): a group of North American Indian tribes, forming the Chimmesyan linguistic stock, residing between the Nass and Skeena rivers, British Columbia, together with the adjacent territory and the islands off the coast. They subsist chiefly on the products of the rivers and the sea, especially salmon and oolachen, the latter furnishing large quantities of oil. They also hunt bear, mountain goats, and other large game, the horns of the goats being carved into spoons and ladles which are used in their communal feasts. They also make dug-out canoes, but most of the boats are purchased from the Haidas. Their houses are constructed of immense cedar beams and planks and often are large enough to accommodate a hundred persons, who are presided over by a house chief. Each family and town also has its special chief. The population of the tribes forming the stock is about 4,100, including about 950 forming Duncans' colony at New Metlakahtla on Annette Island, Alaska. The principal tribes are the Nass and the Tsimshian proper.

TSI-NAN-FU, *tsē'nän'foo':* China, the capital of the province of Shantung, situated near the south bank of the Hoang-ho river, 220 m. s. of Peking.—Pop. 300,000.

TSITSIKAR, *tsēt-sē-kär':* Manchuria, a town in the province of Hilung-Chiang, situated on the Nanni, a branch of the Sungari river, near the Mongolian fron-

tier, 470 m. n.w. of Vladivostok. It is an important station on the Eastern Manchurian railroad, has large fairs and a considerable traffic in furs and grain.—Pop. about 30,000.

T-SQUARE: a rule having a cross-piece (called a *helve*) at one end for making perpendicular lines, or for cutting angles—so called from its shape; a T-rule. RIGHT TO A T, perfectly square or correct, as if a T-square had been applied.

TSU-SHIMA, *tsoo-shē'mä:* Japan, an island in the Korea Strait, about midway between Korea and the Japanese island of Iki Shima. It is 50 m. long by 10 m. wide, and almost cut in two by a deep bay.—Pop. 38,636.

TSUNG-LI-YAMEN, *tsoong'lē'yä'mŭn:* the name of the department of foreign affairs in the Chinese government. See CHINA.

TSURUGA, *tsû-rûg'ă:* seaport-town of Japan, cap. of the ken or administrative division of Tsuruga, prov. of Echizen; on the n.w. coast of the main island, at head of a deep bay forming the finest harbor on the Sea of Japan. It possesses one of the oldest Shinto temples of the country, Kei-no-miya. Junk-building is the chief industry.—Pop. 15,000.

TSUSHIMA, *tsû'shē-ma:* two outlying islands forming a province of Japan, commanding the s. entrance of the Sea of Japan, and therefore of considerable strategic importance; 261 sq.m. Idzu-no-hara, the cap. (lat. 34° 12½′ n., long. 10° 29′ w. of Tokio), is the s. island, which contains many mountains and deep ravines. Wani-ura, on the n. island, is only 32 m. from Fusan, a treaty-port of Corea. The channel which divides the two islands varies from a few yards to several miles in width. Tsushima exports large quantities of dried fish, sea-weed, mushroom, and timber, chiefly to China. Gold and silver have been mined in Tsushima, and there are beds of coal of good quality. Ten thousand men forming the advance-guard of Kublai Khan's expedition for the conquest of Japan in the 13th century were defeated here with great slaughter.—Pop. town 8,800; province 30,000.

TUAM: Ireland; an ancient town in the county of Galway, Connaught, 126 m. w. by n. from Dublin. It is the seat of the Roman Catholic archbishop, and of the Anglican bishop of Tuam. Its principal edifices are the Protestant and Roman Catholic cathedrals, the bishop's palaces, the college of Saint Jerlath, for the education of Roman Catholic clergy; the court-house, national and other schools. The manufactures are confined to canvas and a few coarse linens, but the trade in grain is considerable.—*Pop.* (1901) 2,896.

TUAMOTU, *twä-mō'too,* or PAUMOTU, *pow-mō'too.* ISLANDS, or LOW ARCHIPELAGO, Polynesia: a group of islands in the Pacific Ocean, belonging to France, and situated between lat. 14° and 25° s., and between lon.

124° and 148° w., s. of the Marquesas Islands, and e. of the Society Islands. The group consists of about 80 atolls with a combined area of 366 sq.m. They are, with a few exceptions, of low coral formation, and the surrounding waters are beset with reefs. Cocoanuts, yams, and bread-fruit, and pearl, are about the only products. Pitcairn and Ducie Islands belong to Great Britain; the rest are French, and administered from Tahiti. The group was discovered by Quiros in 1606, and came into the possession of France in 1881. In 1903 a severe storm and flood visited the islands and many of the inhabitants perished.—Pop. about 5,000.

TUAREGS, TUARICKS, or TAWAREK: a fierce and powerful race of Berber origin, professing to be Mohammedans, but different in their practices, religious and social, from most of the believers in that faith. They are virtually independent, although roaming within the boundaries of several jurisdictions, French, Turkish, and Moroccan. The tribe is often predatory, and members of it have been guilty of grave outrages on travellers in the desert. Both men and women are of fine physique, and the women go unveiled, and take part with the men in the public affairs of the tribe. Tuareg is the Arabic name for the tribe. They call themselves Imoshagh. See BERBERS.

TUB, n. *tŭb* [Dut. *tobbe;* Low Ger. *tubb;* Ger. *zuber*e, a two-handled vessel, a tub—from OHG. *zwo,* two, and *beran,* to bear]: an open vessel made of staves and hooped, used for various purposes, as a wash-*tub,* butter-*tub,* etc. (compare bath-tub); a box in which coals are sent up the shaft of a coal-mine; a small liquor-cask formerly used in smuggling-operations; in *OE.,* a state of salivation, so named because patients were formerly sweated in a tub: V. to plant, set, or put in a tub; *familiarly,* to take a bath. TUB'BING, imp.: N. in *mining,* the lining of a shaft with wood or iron for the purpose of preventing the falling in of the sides or of loose material from them, often made air and water tight. TUBBED, pp. *tŭbd.* TUB'BY, a. *-bĭ,* familiarly, like a tub. TALE OF A TUB, any ridiculous story.

TUBA, n. *tū'ba* [L., a trumpet]: a brass wind-instrument, the lowest as to pitch in the orchestra; also a high-pressure reed-stop of 8-ft. pitch on an organ; called also tuba mirabilis, tuba major, tromba, or ophicleide.

TUBE, n. *tūb* [F. *tube;* It. *tubo,* a tube—from L. *tubus,* a pipe, a tube]: a pipe; a hollow cylinder of wood, metal, or glass for conveying fluids, etc.; a siphon; one of the vessels of animals or plants for conveying fluids or other substances; a telescope, particularly without the fittings: V. to furnish with a tube or tubes. TU'BING, imp.: N. tubes collectively. TUBED, pp. *tūbd.* TUBE PLATES, the plates into which the tubes of multitubular boilers or surface condensers are inserted and secured. TUBE-SHEETS, the plates at the front and back ends of

a locomotive boiler in which the tubes or flues are inserted. TU'BIFORM, a. *-bĭ-fawrm* [L. *forma*, shape]: in the form of a tube.

TUBER, n. *tū'bėr* [L. *tuber*, a hump, a knob or excrescence—from *tumĕō*, I swell]: a thickened, roundish, underground stem, as a potato, a turnip, etc.; in *surg.*, a swelling; in *anat.*, the rounded projection of a bone. TUBERIFEROUS, a. *tū-bėr-ĭf'ėr-ŭs* [L. *fero*, I bear]: producing or bearing tubers, as the potato.

TU'BER: in *botany*, a subterranean stem, thickened by approximation of the nodes and swelling of the internodes, with latent buds along its sides ready to produce new plants in the succeeding year. The cellular tissue is unusually developed, and in general a large quantity of amylaceous matter is accumulated, whence the economical value of tubers, as in the potato, the Jerusalem artichoke, and the arrow-root. Tubers are capable of being employed for the propagation of the plant, by division into portions, each containing an *eye* or bud, according to the usual mode of planting potatoes. The most valuable tubers are those above named, but many others are used in different parts of the world: see OXALIDEÆ: TROPÆOLUM: ETC.

TUBERCLE, n. *tū'bėr-kl* [OF. *tubercle;* F. *tubercule*—from L. *tuber'cŭlum*, a small hump or protuberance—from *tūber*, a hump: It. *tubercolo*]: a little knob; in *med.*, a small, hard, local tumor, which, when deposited in numbers on the lungs, and suppurating, produces the disease known as consumption (see TUBERCULOSIS): a pimple or tumor appearing on the skin; in *bot.*, a swollen simple root, as of some orchids; a little tuber. TUBERCLED, a. *tū'bėr-kld*, having or affected with tubercles; in *bot.*, covered with warts. TUBERCULAR, a. *tū bėr'kū-lėr*, full of small knobs or tubercles; caused by tubercles, as consumption; prone to generate tubercles. TUBER'CULATE, a. *-lāt*, tubercled; in *bot.*, having tubercles. TUBER'CULOUS, a. *-lŭs*, or TUBER'CULOSE, a. *-lōs*, affected with tubercles; disposed to tubercular diseases.

TUBERCULIN, *tū-bėr'kū-lĭn* [L. *tuberculum*, tubercle, and term. *-in*]: paratoloid; the substance used by Prof. Robert Koch for cure of tuberculosis: see KOCH, ROBERT.

TUBERCULOSIS: a disease characterized by the production of tubercles in the internal organs, particularly in the lungs. No age or race is exempt from the 'great white plague.' Over 2000 years ago Hippocrates wrote that 'The greatest and most dangerous disease and the one that proved fatal to the greatest number was consumption.' Phthisis was recognized as a communicable disease by the early Greek physicians. At Naples in the 18th century, failure to report a case of consumption was punished by a fine, and a second failure by banishment. Lænnec, early in the 19th century, strongly advocated the unitarian nature of consumption and its con-

nection with tuberculosis. Koch, in 1882, furnished the final proof that phthisis and other tuberculous diseases are due to tubercle bacilli.

Pulmonary tuberculosis is the most universal disease of the present era. Two per cent of all living human beings are said to be afflicted with it, between one and two millions in the United States alone. In the whole world there are over a million deaths each year from this malady. There has been a material reduction in the death rate from consumption in this country—from 245.4 per 100,000 persons in 1890 to 187.3 per 100,000 in 1900, and the agitation of later years is decreasing the percentage.

The first state sanatarium, that of Massachusetts, was opened in 1898, and was designed more especially for incipient cases. The first private sanatarium was established in 1859 by Herman Brehmer, himself a consumptive, in the mountains of Silesia. There are now many private, state, and municipal sanataria for the tuberculous in the United States. In addition to these there are special tuberculosis dispensaries, societies for the prevention of tuberculosis, tuberculosis exhibitions, journals, institutes, and congresses, all devoted, and with considerable success, to the prevention and cure of this dread disease.

According to the *Insurance Press*, 59 per cent of the deaths from consumption occur under 45; 29 per cent between 45 and 60; and 12 per cent above 60.

The influence of heredity in predisposing to certain diseases is by the transmission of a peculiar susceptibility to the malady, rather than by transference of the disease itself. This congenital family tendency to particular affections is related to the physical, mental, and moral characteristics handed down by parents to their children. Family predispositions to epilepsy or insanity to scorfula, cancer, gout, and rheumatism are most frequent and important. Hereditary tuberculosis is extremely rare, the sequence of tuberculous parents and children being due to an enfeebled constitution (often by alcholism) and continual exposure to infection through household proximity. Until recently the influence of heredity in causing tuberculosis was much overestimated. Only about one-third of tuberculous cases are of tuberculous parentage, and only 10 per cent more of children of tuberculous parents have the disease than of other children.

Tuberculosis is a communicable disease, usually chronic, due to invasion by tubercle bacilli, which give rise to tubercles (small roundish lumps) and diffuse infiltration. The tubercle bacillus is aërobic (needing oxygen for its development) outside the body, and grows only on or in suitable culture media. Within the body it is distinctly a parasitic and more or less anaërobic (growing in the absence of oxygen). Jousset's experiments have shown

that tubercle bacilli are destroyed by direct sunlight in one hour, and by diffuse sunlight in four to seven hours.

The number of tubercle bacilli evacuated in the sputa of even an ordinary case of chronic ulcerative phthisis is something enormous. Nuttall has estimated that a single tuberculous patient may discharge from 250,000 to 7,000,000,000 bacilli each day. The number is no evidence, however, of the stage or severity of the disease. Finding tubercle bacilli in the expectoration is not absolute proof of the presence of tuberculosis in the tissues, since these germs may vegetate as saprophytes (developing in dead or decaying organic material) for long periods, but may also become virulent at any time, causing infection or recrudescence of the disease. The tubercle bacillus has little individual energy, but follows more aggressive germs and takes root in a soil enervated by neglect, misfortune, or intemperance.

In order for infection of the lungs to take place, the tubercle bacilli must gain access to the connective tissue between the air vesicles, forming tubercles by proliferation of fixed connective tissue cells. Generally speaking, tubercle formation begins rather deeply and extends towards the periphery, usually by way of the mediatinal, bronchial, and mesenteric glands and lymphatics. The presence of tubercle bacilli in the tissues excites cheesy degeneration, ulceration, scar tissue formation, and deposit of calcareous matter, one or all combined.

The chief factors for combating the lodgment and multiplication of tubercle bacilli in the body are the ciliated epithelial lining of the upper respiratory tract, the bactericidal action of the nasal mucus and gastric juice, and the phagocytic, antitoxic and opsonic properties of the blood. Tuberculosis may attack any part of the system. When the skin is involved the disease is termed lupus; when the glands; scrofula; the brain and spine, meningitis; the abdomen, peritonitis. Tuberculous laryngitis is nearly always secondary to the pulmonary affection.

The various types of pulmonary tuberculosis represent different degrees of infection and of individual resistance and reaction. Other regional forms of the disease may be primary in origin, but are more frequently secondary to the pulmonary trouble. Tubercle bacilli give rise to 'cold abscesses,' usually in connection with bone. Scrofula is now generally considered to be a quiescent or slowly progressive type of tuberculosis, affecting particularly the glands and joint surfaces. Recent investigations point to the probability that most, if not all, cases of pseudo-leukemia (Hodgkin's disease) are tuberculous in nature.

The common mode of entrance of the tubercle bacilli into the system is by inhalation of dried sputum in the form of dust. While in direct sunshine this loses its virulence within an hour or so, in shady rooms its power

for harm is greatly extended. Dry sputum, says Stone, has retained its infectious properties for two years; three years in the moist state.

Occasionally infection takes place directly by way of the watery drops expelled during coughing, and alighting on another's lips or nostrils. Secondary auto-infection often results from the aspiration of caseous matter from a broken-down bronchial gland, ulcer of the larynx or trachea, or tuberculous area elsewhere in the lung. Butchers and veterinary surgeons not infrequently suffer from localized tuberculous lesions contracted from the flesh of tuberculous cattle.

Much less frequent than infection by sputum dust is the tuberculosis resulting from drinking the milk and eating the flesh of tuberculous cattle. It is variously estimated that from 5 to 20 per cent of cattle are tuberculous. Three-fourths of all deaths from *tabes mesenterica* occur in children under 5 years, and especially in infants fed on unboiled milk. It is probable that tuberculosis is conveyed by means of cow's milk only when the tuberculous disease affects the udder. After many year's experimentation along this line, Behring affirms that human and bovine tubercle bacilli are practically identical. Suspected milk can be freed from danger and preserved as to its creaming capacity by heating not less than twenty minutes in a closed pasteurizer at 60° C. (140° F.). The possibility of tuberculous infection through human milk is somewhat remote.

Tubercle bacilli are often present on fruit exposed to street dust, and have even been found in cigars made by hand, owing to the fact that the outer leaf is moistened with saliva. Books, toys, furniture, and clothing may likewise carry the infection.

Exposure to contagion under debilitating circumstances is the prime factor in initiating the disease, and much has been laid at the door of heredity that should be charged properly to the fact of family or business proximity, or to dwelling in quarters previously occupied by a tuberculous subject. In many instances of tuberculosis in adult life the infection started in childhood, remaining latent for a long time.

The ubiquity of tuberculosis is remarkable. Though naturally more prevalent in thickly settled civilized communities, yet even wastes and wilds are not wholly free from the scourge. During the Wellmann expedition a polar bear killed on the ice showed undoubted signs of tuberculosis. Curschmann states that 38 per cent of the deaths of sailors in the Hamburg and Bremen hospitals are due to tuberculosis. Pulmonary tuberculosis is most rife in low, damp regions of the temperate zone, but when contracted in high altitudes or on the ocean it is exceptionally fatal.

In view of the universal distribution of the disease, it is evident that we are all exposed to the inroads of

tubercle bacilli in varying numbers. Yet, despite the German proverb, not everybody has tuberculosis. The predisposing factors are hence of great importance. Whatever lowers the vitality and resisting power of a person renders him more liable to become a victim of the tubercle bacilli. When the index of health ranges high, one can expose himself with impunity to the ordinary public dangers of infection. But when depression and debility from any cause are present, the individual is in danger of falling a prey to his invisible enemies. Hence disease, injury, or shock, worry and anxiety, alcoholic intemperance and excesses of all kinds, and every deviation from a natural and regular mode of life, predispose to pulmonary tuberculosis. Lancereaux attributes nearly half of all cases of tuberculosis to malnutrition depending on an insufficient supply of fresh air.

Of lung affections bronchopneumonia is perhaps most frequently followed by tuberculosis. Catarrhal bronchitis, whooping cough, and pleuropneumonia are also common predisposing factors. One may strongly suspect beginning tuberculosis when the respiratory symptoms continue into the normal period of convalescence. Of particular significance in this regard are cough, pleural pains, intermittent fever, and circumscribed physical signs about the apex of one lung. Deformities of the chest from pleurisy, rickets, or spinal disease tend to develop fit foci for any infection. Among general morbid conditions predisposing to tuberculosis chronic alcoholism has a bad pre-eminence. Grip, typhoid fever, measles, smallpox, scarlet fever, and venereal diseases are also phthisiogenic. A weak heart or defective circulation and imperfect development of arteries or veins obviously favor tuberculous infection.

Pregnancy and prolonged lactation not seldom hasten the fair wife into a consumptive's grave. Consanguineous marriages appear to intensify tuberculous tendencies. Among the Manx people, for example, such marriages are the rule, and the death rate from consumption is about double that in England and Wales.

Even more important as predisposing agents are bad hygiene, overcrowding, and underfeeding. Hence pulmonary phthisis is more frequent and more fatal in the poor people of the tenements than among the well-to-do. For similar reasons, occupation is of great moment. Because of the cramped quarters and working in small, close rooms, tailors are of all sedentary workers most subject to phthisis. Vocations necessitating the inhalation of much irritating dust or gases, or frequent exposure to cold and wet, also predispose to this malady, although, as in farmers, an outdoor life may more than counterbalance deleterious influences. The fashion of wearing long skirts, which trail through the multifarious filth of city streets, is a possible source of tuberculous infection.

Often the first evidence of pulmonary tuberculosis is

an obstinate cough following a slight cold or an acute infection. This cough may be a slight, dry, ineffectual hacking, or it may be looser and more bronchial and paroxysmal in nature. There is often a history of persistent unproductive cough on lying down at night, or of slight morning hacking and clearing of the throat.

Spitting blood is also a common early danger signal. It is usually slight at this time, and is due to congestion of the bronchial mucous membrance. The bleeding is liable to recur at variable intervals, with or without apparent exciting cause. Previous pleurisies are always suggestive of a tuberculous taint.

The early tuberculous patient frequently complains of pain in the neck and above one eye, an indistinct congestive soreness in the upper part of the chest, shifting neuralgic pains due rather to general anemia than to any localized affection, and sharp pleuritic attacks aggravated by coughing. There is also at times a sensation of resonance in the chest while talking.

Perhaps the most suspicious symptom of incipient phthisis is apparently causeless progressive loss of appetite, weight, and strength. Many cases begin with persistent unexplained dyspeptic symptoms, and these are likely to do badly. The motor function of the stomach is generally depressed; the secretory function is first excessive, then diminished below the normal. Easy chilling and a constant tendency to 'catch cold' are suspicious symptoms. In children one may note great restlessness and irritability, often lasting weeks or months before more definite symptoms present themselves. A slight rise in temperature after walking some distance, or following nervous disturbances, or preceding the menstrual period, is a sign that should be sought for carefully. A subnormal early morning temperature is also significant. A tendency to perspire freely after slight fatigue or emotion, chilly sensations and flashes of heat, rapid pulse in the absence of fever, and diminished blood pressure, are suggestive vasomotor symptoms. Night sweats, transitory flushing of one cheek, and fleeting pains in the chest and the shoulder muscles, while not at all definitive of tuberculosis, should at least lead to a careful physical examination of the whole chest.

In the fully developed case of plumonary phthisis, with extension and breaking down of tubercles to form abscesses and cavities, the subjective symptoms are generally marked. The more severe the general symptoms are, the more likely is the presence of multiple foci and a mixed infection. Weakness and emaciation are apt to be conspicuous, though there are many exceptions to this rule. Bleeding from the lungs is now much more profuse and serious, since it results ordinarily from the erosion of vessels of some size or the rupture of small aneurysms, probably produced by aspiration of the arteries during fits of coughing.

The hectic, or remittent, type of fever prevails, with an afternoon maximum of 102° to 104° and a morning temperature of 100° to 100.5°. From 2 to 6 a.m. the temperature is often subnormal. In children the range is more irregular than in adults. Phthisical fever is due mainly to infection with streptococci. If it reaches 101° or higher, with night sweats, cheesy softening is probably present. Cough is more or less troublesome, and depends, for the most part, on a circumscribed catarrh of the bronchial tubes. The expectoration is usually mucoid, scanty, thick, and tenacious, and is voided with considerable difficulty. Eventually, however, the cough becomes looser and the sputum more profuse, liquid, and purulent, and is sometimes blood-stained. Both cough and expectoration are often most marked on rising, owing to accumulation of sputum during sleep. Rapid breathing becomes progressively more noticeable, but subjective dyspnea is not felt till a very advanced stage when the functionating living tissue is much reduced. Circumscribed pleuritic pain is exceedingly common, and is complained of most frequently near the nipple.

The appetite is capricious or wanting, and nausea and vomiting are sometimes excited by food or the swallowing of sputa, and also, one regrets to say, by medicines. Obstinate diarrhea, due ordinarily to tuberculous ulcers, is a late and grave symptom. The gastric disturbances may be due in part to reflex irritation through the pulmonary fibers of the pneumogastric. Hoarseness or aphonia, with laryngeal pain especially marked on swallowing, is practically certain evidence of tuberculous laryngeal involvement. Heart failure, characterized by blueness and coldness of the extremities is a symptom urgently demanding medical intervention.

Tuberculous patients as a rule exhibit hope and confidence in ultimate recovery, sometimes even when *in extremis*. Otherwise the chronic invalidism renders their judgment unbalanced and their dispositions somewhat suspicious and exacting.

Spontaneous cure takes place in from one-third to one-half of all cases of pulmonary tuberculosis. The outlook in any given instance depends mainly on three factors: The extent of pathological changes, the patient's constitution, and his moral and physical environments. It has been truly said that with consumptives prognosis is largely a question of money. The degree in which heredity enters into the prognostic problem is a matter of dispute among authorities. There can be no doubt that the evil effects of exposure by proximity to consumptive relatives has often been misinterpreted as hereditary taint. On the other hand, it is evident that the members of a small-lunged and thin-chested family are especially liable to develop pulmonary tuberculosis.

The average duration for all cases of chronic ulcerative phthisis is about two and one-half years. Acute cases

may terminate fatally in from two to ten weeks, while the subject of the most chronic type may survive for a dozen years or more. A peculiar fact is that apparently full-blooded individuals usually succumb to tuberculous disease more quickly than anemic persons. Whatever is to be done for a tuberculous patient should be done without delay, since organic changes once established are irrevocable.

Death from pulmonary tuberculosis is usually the result of a mixed infection and toxemia, with gradual failure of strength. Next come complicating conditions, particularly bronchitis, pneumonia, pleurisy, pneumothorax, amyloid disease, nephritis, and diabetes. Third in order to be mentioned is tuberculosis of other organs, particularly the meninges, intestines, and genitourinary tract. Sudden and alarming is the end when due to hemorrhage, commonly from the rupture of an aneurysm in the wall of a lung cavity, and rarely without hemoptysis (coughing up of blood) if the cavity be large. Death by syncope is comparatively seldom seen, but may result from embolism or thrombosis of the pulmonary artery, pneumothorax, tapping for pleural effusion, or while walking about in a moribund state. Finally suffocation rarely closes the scene in acute pneumonic phthisis, and very rarely in chronic phthisis complicated with pneumothorax or serofibrinous pleurisy or with a large, neglected, or undiscovered empyema.

The successful treatment of pulmonary tuberculosis is mainly a matter of nutrition and regimen. A steady gain in weight should be one chief aim. In order to accomplish much, the patient must take nourishment every two or three hours in the daytime. Night feeding is often required in active phthisis. Fats and proteins (animal tissues) should predominate as a rule, though an excess of fats is contraindicated when dyspepsia and diarrhea are present. Good, rich milk will in most cases serve as a dietary basis, and the quantity taken ought to be limited only by the capacity of the patient. Many persons imagine that they cannot take milk, but nearly always by persistent effort they find they are able to do so. It should always be taken sip by sip, best alternated with well masticated bites of solid food. The dilution of the milk with plain water, Vichy, or lime water, the addition of a pinch of salt or baking soda to each glassful, and in intractable cases peptonization, all serve to render the milk more digestible, and one and another method should be tried until it is well borne. Salted crackers often aid in making the liquid more agreeable. Biliousness arising from the free use of milk is easily prevented by the addition of sufficient fruit to the dietary, and by an occasional dose of calomel or blue mass. Buttermilk, kumyss, kefyr, and matzoon are relished and well borne by some patients.

The second most important article of diet in tuberculous cases is eggs, preferably raw or soft-cooked, and in

number from 6 to 24 daily. These furnish a large amount of nutriment in a comparatively small space, and are easily digested as a rule. Raw eggs can be made more palatable by salting and peppering or spicing with nutmeg and other condiments, or by beating up with broth or sherry or whisky and sugar. Some prefer the fresh raw yolks only, beaten up with a little sugar or salt. Swallowed directly from the shell, eggs are very soothing to an irritable laryngeal cough. Meats are also a valuable factor in the tuberculous patient's diet. Raw beef scraped to a fine pulp and served with salt and pepper, or covered with a layer of grated chocolate, is most digestible and nutritious. Beef juice and other forms of meat food may be taken according to individual tastes, but the appetite for fats and bone marrow should be encouraged usually as much as possible. Pork and veal, however, because of their indigestibility, should generally be excluded from the dietary.

A certain quantity of starches and sugars is, of course, necessary. The most digestible forms are fresh toast, thoroughly dextrinized crackers, reheated in the oven, and zwieback, all of which are well taken with an abundance of butter and milk. Rolled oats and most of the various package breakfast foods are eligible dietary additions. They should be served with considerable cream, and ought to be well insalivated before being swallowed. The coarse vegetables, if indulged in freely, are liable to give rise to flatulence and intestinal indigestion.

When dyspepsia is really troublesome the patient should restrict the total amount of food and avoid rich dishes, but it is best not to pay too much attention to minor gastrointestinal symptoms, as these will often pass away of themselves as nutrition improves. It is a good sanitary habit to rinse the mouth with a boric acid lotion or some other mild antiseptic before taking food. There are occasionally patients who really cannot tolerate ordinary foods. These are sometimes much benefited by a short course of predigested food. For laryngeal cases with much pain in swallowing, forced feeding may be employed, with a quart of nutrient fluids or with finely powdered dry meat, introduced directly into the stomach through a nasal or esophageal tube two or three times daily. When wasting is obstinate despite superalimentation, nutrient enemas may be introduced high up into the rectum.

Next to nutrition come fresh air and sunshine as curative agents in pulmonary tuberculosis. During the daytime the patient should be out of doors as much as possible on a couch or easy chair, protected from strong winds and basking in the direct sunlight except in very hot weather. Reclining chairs and beds with a canopy head are a convenience and comfort. At night and whenever the patient is not able to go out, his room, the sunniest in the house if possible, should be thoroughly ventilated all the time by having the window down at

the top or up at the bottom. Tuberculous subjects had best sleep alone. The temperature of the room is to be kept between 60° and 70° F., and a special airing should be given to all its contents while the patient is out. The amount of moisture in the room ought to be maintained (if need be by a humidifier or by a towel suspended above and just dipping into a pan of water) at from 60 to 70 per cent. of saturation, as shown by a simple hair hygrometer.

Window tents are very convenient, and can be used night and day, summer and winter, the patient's head being kept in the open air nearly all the time, using night-caps and other forms of covering if necessary. Even better is living on porches fitted up with protecting screens.

Patients in the early stage are invigorated by stripping nearly or quite naked every day, standing in the sunshine of the room, and going through a regular course of calisthenic exercises with light Indian clubs, with deep breathing, always through the nose. A good method of lung gymnastics, to be practiced perseveringly three or four times daily, is to stand in the open air or before an open window and repeat deep and full respiratory acts 50 to 100 times with the arms in full extension above the head or directly back during inspiration, and then brought down to the thighs during expiration. Short singing exercises are useful, since they bring the diaphragm into play.

The tuberculous individual should learn to walk slowly, with head erect and shoulders thrown well back, taking deep inspirations. No walking or severe exercise is allowable in febrile cases, and absolute rest in bed is demanded for acute types of the disease and in serious complications. Massage or vibratory treatment is often helpful to such patients.

Concerning clothing, this should be of light woolen material in summer, of heavier flannel in winter. A flannel night-gown and loosely knit leggins are grateful at night in cool weather. The underclothing ought to be changed at night. With proper wraps and overcoats, patients can enjoy the fresh air and sunshine of winter as well as of other seasons. Above all the feet should be well protected.

Hydropathy offers much, both as a tonic and as a sedative. Patients get great relief even from so simple a measure as daily sponge baths of lukewarm water and alcohol. Cold douching of the chest and spine, followed by vigorous friction or rubbing with wet towels, is a valuable tonic measure. A practical method, when bath-tub and spray attachment are not at hand, is to stand in a tub with a bucket of cold water at hand, squeeze out a sponge on the back of the neck a few times, and then be rubbed down for 15 or 20 minutes. Kellogg recommends dry rubbing with the hand or mitten, followed by friction with water at 60° F.; also cold wet friction,

commencing at 68° F. and gradually decreasing to 50° F., and finally wrapping a wet sheet around the patient while vigorously rubbed. The entire procedure should occupy only two or three minutes. It is sometimes more efficacious when preceded by a sun bath or vapor bath. Nauheim bath (containing 1 to 1½ per cent. common salt, temperature 93-95° F., five to eight minutes duration) without resistance exercises are also of service.

There are many miscellaneous items of advice which the painstaking physician will impress upon his patient —such as to avoid late hours, cease smoking, and be temperate in all things except the quantity of nourishment taken. The very best results are to be achieved only by the perfect accord of physician and patient in formulating and carrying out every dietetic and hygienic detail. These details, applied with careful individualization, are of vastly greater importance than drugs. The confidence of the physician in his own resources and a cheerful and encouraging manner toward the patient are necessary elements of therapeutic success.

There is no specific cure for consumption. Advertising 'specialists' and cure-all nostrums should be utterly avoided. Of the greatest value, however, is the thoughtful advice of the family physician concerning air, clothing, rest, and diet. Various symptoms and complications, moreover, can be removed or alleviated by simple measures or medicines. Thus, fever is prevented or lessened by cool sponging and by rest in bed; cough is sometimes relieved by the recumbent posture, deep breathing, glycerin and lemon juice, by demulcent troches. mentholated oil sprays, hot drinks, and to some degree by the exercise of will power; prolonged spitting of blood may be checked by deep respirations, diarrhea by mild astringent enemas, and pain by strapping of the chest, mustard, blistering, etc. By the intelligent coöperation of physician and patient, every case of pulmonary tuberculosis can be benefited and a large proportion of those taken early are practically cured.

Climate, though very valuable as an adjunct in treatment, is not a panacea for pulmonary tuberculosis. The majority of incipient cases are benefited by any climatic change. High, cold, dry altitudes are usually chosen for early cases with little constitutional disturbance, even when of a hemorrhagic type. Warm, dry climates are preferable for the catarrhal type; and warm, moist ones for the pneumonic. Nervous patients with a frequent puse and little resistance to cold, do not do so well in high altitudes as more phlegmatic subjects. Convalescents from bronchitis. pneumonia, or pleurisy generally fare well at the higher levels. Contraindications to altitudes are severe hectic symptoms; marked cavity formation; acute phthisis, and dilatation of the heart. The benefits of altitude are mainly mechanical in nature, embracing improved ventilation and enhanced nutrition of the lung, from the increased expansion necessitated by

breathing a rare atmosphere containing less oxygen per cubic foot than at sea level. Other advantages of climatic change are: (1) The greater amount of sunshine —Denver has 42 per cent. of clear days; New York, 27 per cent.; (2) Greater atmospheric dryness, which exerts a siccative action on bronchial and pulmonary lesions and deters the multiplication of germs; (3) A low mean annual temperature, which serves to stimulate the body functions; (4) Less dust (always infectious); (5) Augmented blood formation; (6) The exhilarating mental effects of new scenes. Tuberculous patients with much fever and difficult breathing often fare best by spending the summers in Colorado and the winters in the mild, dry regions of Arizona or New Mexico. Change of climate is very frequently a health-restorer and life-saving procedure for those who can afford the expense and for those who are willing and able to 'rough it,' but nothing can exceed the pitiful misery of that poor, homesick, moneyless consumptive stranded in a 'health resort' in the last stages of the disease, only to die among strangers in a strange land. The chief value of any climate for tuberculous subjects lies in their ability to get the maximum of fresh air both day and night in every season. That climate and altitude are not certain in producing immunity against tuberculosis is shown by the increasing number of deaths from consumption reported as originating in Colorado. The death rate from pulmonary tuberculosis is only a trifle less in mountainous Norway than in the lowlands of Prussia or the Netherlands.

The prevention of pulmonary tuberculosis is a twofold task: namely, to increase the natural resistance of predisposed individuals, and to avoid giving or taking the specific infection. The tuberculously inclined must avoid overwork, and should have regular annual vacations. He (or she) should wear loose clothing about the chest, lie down to rest before and after eating, and try to obtain at least eight hours' sleep every night. He must endeavor to harden his system by daily cold sponging or cool baths with friction, and should keep nutrition up to the highest standard, using fats and flesh foods most largely. He should take systematic exercise on foot daily in the open air, and become an active member of an athletic club. An erect attitude and the regular practice of deep breathing have an excellent effect in guarding against tuberculous invasion. Any obstruction to free nasal respiration is to be corrected by douches or surgical measures.

Children of tuberculous parentage should be reared away from the afflicted father or mother when practicable, which is of course not often the case. Such children are to be fortified against colds and catarrhs by an abundance of fresh air, cool sponging of the chest, lung gymnastics, and generous diet, consisting chiefly of fats, milk, cream, eggs, and bread and butter. Enlarged tonsils ought to be excised; tuberculous lymph glands should

either be thoroughly extirpated or else be let severely alone.

The prevention of infection of sound persons by tuberculous ones can be accomplished with almost absolute certainty by the destruction of the patient's sputum before it has had time to dry and mingle with the dust of rooms and streets. If all consumptives could be induced to destroy their sputa promptly and thoroughly, tuberculosis might be soon only a sad memory. Much the best method of destroying tubercle bacilli is by fire. The patient may use pieces of muslin or cheese-cloth or Japanese handkerchiefs instead of the ordinary handkerchief, and throw them at once after expectoration into the fire. When this is impracticable, as often in summer, or when the patient goes away from home, the sanitary spit cups of paper, enclosed within a metal box, answer the purpose admirably. The paper box and its contents can be burned, and the box be renewed as often as need be, and the metal receptacle sterilized by heat. Less desirable, but still efficient from the sanitary standpoint, is the use of cuspidors or covered china cups, half filled with a 1:500 mercuric chloride solution or a 1:20 dilution of carbolic acid. Wood vinegar and concentrated lye are recommended as cheap and effective germicides.

Another preventive measure that ought to be observed is boiling the bedding for one-half hour, after soaking in 5 per cent. carbolic solution. It is well for these patients to sleep alone in a well-aired room, and to avoid kissing their friends and relatives. Men should go cleanshaven, or at least wear the beard short. Each consumptive should have his own eating and drinking utensils.

The victims of pulmonary tuberculosis are liable to reinfect themselves by inhaling their own sputum dust or otherwise. Mixed infection is probably best avoided by rational antiseptic care of the oral cavity. Patients must be warned against swallowing their own sputa. Persons with latent tuberculosis of the apex should exercise every precaution to avoid pneumonia, which is very fatal in these instances, owing to the absorption of toxins.

Of immense prophylactic and therapeutic importance are sanitaria equipped at public expense or by private philanthropy for the treatment and sanitary education of tuberculous patients in the incipient stage. Many of these get practically well, and go forth as trained apostles of the creed, 'Thou shalt not spit promiscuously.'

TUBEROSE, a. *tū'bėr-ōs,* or TU'BEROUS, a. *-ŭs* [L. *tūber,* a protuberance, a hump]: having knobs or tubers; connected into a bunch by rootlets, as in the potato. TU'BEROUSNESS, n. *-nĕs,* state of being tuberous. TU'BEROS'ITY, n. *-ŏs'ĭ-tĭ,* in *anat.,* a kind of projection or elevation; the state of being knobbed. TUBEROSE, n. *tūb'rōz* or *tū'bėr-ōs,* a highly odoriferous flowering plant of the genus *Polianthes,* nat. order *Liliaceæ,* having a funnel-shaped perianth, with 6-parted limb, stamens inserted in the

tube of the corolla, a superior capsule, and flat seeds. The COMMON TUBEROSE (*P. tuberosa*), native of Ceylon, has rounded bulbous roots; a cylindrical, upright, unbranched stem, three or four ft. high; both root-leaves and stem-leaves sword-shaped, and very acute; flowers spiked and somewhat aggregated, large, pure white, the tube a little curved. The plant grows well in the south, but bears the open air in more northern climates only during summer. In the n. United States it is a greenhouse plant. The roots are a considerable article of export from the s. to the n. of Europe; the plant being in high esteem for the beauty and fragrance of its flowers, whose odor is most powerful after sunset, and has been known to cause headache and asphyxia in a room. The fading flowers emit, in certain states of the atmosphere, an electric light and sparks. The flowers yield an essential oil used by perfumers; more than a ton of flowers for this purpose are yearly raised in the Var valley, France. Anothe species, *P. gracilis*, is said to be found in Brazil. The tuberose has been known in Europe about three centuries.

TUBE'-WELL: contrivance for obtaining a moderate supply of water in a very short time by application of a limited amount of manual power. The apparatus—invented in the United States—comprises three parts—a tube or well, a rammer or monkey, and a pump. The tube consists of an iron pipe about $1\frac{1}{4}$ in. diameter, made in pieces of convenient length, which can be screwed together end to end. The pipe terminates at the lower end with a solid tempered steel point, and is perforated for about 16 in. from the end with small lateral apertures. The pipe is driven into the ground far enough to keep it upright without falling, and is temporarily kept in that position by hand. A strong iron clamp is fixed to the tube by clamping-screws at a short distance above the ground; and another clamp is similarly fixed higher up. Two pulleys are supported by the upper clamp. The rammer or monkey consists of a 56-lb. iron weight, which slides up and down the tube, encircling it like a ring or belt. The rammer, being raised by two men, is allowed to fall with its full weight on the lower clamp, thus giving a series of blows which drive the tube into the ground. When the lower clamp becomes level with the surface of the ground, it is raised up the tube; as is likewise the other clamp, which supports the two pulleys. Successive lengths of tube and successive shiftings of the clamps afford the means of enabling the pointed and perforated end of the tube to be driven down to a depth whence water can be obtained. When the symptoms of water being reached appear, a small suction-pump is applied, and the water pumped up. It is only when water is expected at a moderate distance below the surface that this apparatus is available, as it is not powerful enough for very great depths, nor is the bore of the tube suffi-

cient for a large influx of water; but where the required conditions exist, the apparatus saves a great amount of time and expense in sinking a well. As the water is pumped up, the loose sand and gravel disappear from the point of the tube, allowing the formation of a small pool or well around its lower end; while the small pebbles which collect around the perforations act as a sort of filter. The tube can be extracted from the ground by forcing the rammer upward against the upper clamp. Tube-wells have been sunk to a depth of 10 ft. in 22 minutes—obtaining water; and water has been reached in even less time. One was sunk to a depth of 150 ft. in Ithaca, N. Y. This form of well has less liability than other forms to receive dirty surface-water; and no accident is possible from foul air or from the falling in of the sides. Tube-wells have been sent out with troops on military expeditions.

TUBICOLÆ, n. plu. *tū-bĭk'ō-lē* [L. *tubus,* a tube; *colo,* I inhabit]: order of *Annelida* (q.v.), having a tubular shelly covering, into which the animal can entirely retreat, but from which, when undisturbed and disposed to activity, it projects its head and gill-tufts. The genus *Serpula* (q.v.) is a good example. TUBIC'OLOUS, a. *-ō-lŭs,* inhabiting a tube. TUBIC'OLAR, a. *-ō-lėr,* pertaining to the Tubicolæ.

TUBICOLIDÆ, *tū-bĭ-kŏl'ĭ-dē,* or GASTROCHÆNIDÆ, *găs-trō-kē'nĭ-dē:* family of lamellibranchiate mollusks, remarkable for the calcareous tube into which the proper shell is cemented: for examples, see ASPERGILLUM: CLAVAGELLA: GASTROCHÆNA. The *Pholadidæ,* including Pholas (q.v.) and Teredo, are included by some in this family. *Teredo* has the characteristic tube, but *Pholas* has not.

TUBICORNOUS, a. *tū'bĭ-kŏr'nŭs* [L. *tubus,* a pipe; *cornu,* a horn]: having hollow horns; composed of a horny axis, covered with a horny sheath, as in the TU'BICORNS, *-kŏrnz,* a family of ruminants.

TÜBINGEN, *tü'bĭng-ėn:* important town of Würtemberg, circle of the Black Forest; 20 m. s.s.w. of Stuttgart, on the Neckar, at the influx of the Steinlach. Tübingen, which is in one of the most beautiful and fertile districts of the Oberland, is an old place, irregularly built, with steep, narrow streets; but the suburbs, especially around the new university, are very pleasant. West from Tübingen is the Schloss, built by Duke Ulrich, 1535. Book-printing, book-selling, working in copper, weaving, bleaching, trading in field-produce, wine, and fruits, are principal industries. Tübingen has three Protestant churches and one Roman Catholic church, a chamber of manufactures, a Bible Soc., and various educational and benevolent institutions. But it owes its celebrity wholly to its university. Founded 1477 by Eberhard im Bart, afterward first Duke of Würtemberg, the University of Tübingen soon became a distinguished seat

of learning, was favored for a time with the presence of Reuchlin and Melanchthon, and continued to flourish long after the Reformation had firmly established itself. The university adopted the Reformed faith 1534, and received 1536 the addition of a Protestant theological seminary; a Roman Catholic theological faculty, the 'Convict,' was added. The Thirty Years' War was an almost fatal check to its prosperity; and it was not till the early part of the 19th century that it began to regain reputation. Under Baur it became celebrated as a school of historico-philosophical theology, known as the 'Tübingen School.' The university has 6 faculties, more than 100 professors and teachers, a library of 200,000 vols. (in Duke Ulrich's *Schloss*); and is attended annually by 1,300 to 1,500 students, of whom between 700 and 800 are foreigners, many from the U. S. Connected with it are an anatomical and physical institute, a botanical garden, a chemical laboratory, a collection of zoology and comparative anatomy, one of minerals, one of coins and antiquities, fencing, gymnastics, and swimming schools, etc.—Pop. of Tübingen (1880) 11,708; (1885) 16,660; (1900) 15,338.

TÜBINGEN SCHOOL: a name given to two separate and very different schools of philosophy, because their founders were connected with the famous University of Tübingen. The old school of Tübingen was orthodox. Gottlob Christian Storr, its founder (1746-1805), professor of philosophy at Tübingen in 1775, and professor of theology two years later, accepted without reserve the divine authority of the Scriptures, and defended miracles. Storr severely criticised Kant's book: *Religion Within the Limits of Pure Reason,* and he set forth his own system in a work called: *Theory of Christian Doctrine Drawn from the Scriptures.* The later or modern school is that of Ferdinand Christian Baur (1792-1860), also professor of theology at Tübingen. Besides attacking the authenticity of certain of the Pauline epistles, he attempted to show that the fourth Gospel was not genuine. He admitted the morality of Christianity, but denied the miracles attributed to Christ and his apostles. Although Baur moderated his tone in later years his teachings promoted the spread of unbelief, and the *Life of Jesus* by Strauss (1832), which attempted to show the Gospel to be a philosophic myth, was the outcome in a large degree of the critical studies of Baur.

TUBUAI, *tô-bô-ī',* or AUSTRAL ISLANDS, Polynesia: a group of islands belonging to France, and situated in the Pacific ocean s. of the Society Islands. Combined area, 111 sq.m. They are fertile, and produce tobacco, bananas and arrow-root. The cocoa-palm is rare, and the bread-fruit is not found here.—Pop. (1897) 1,783.

TUBIPORE, n. *tū-bĭ-pōr* [L. *tubus,* a pipe; *porus,* a passage]: one of the genus of coral zoophytes; organ-pipe coral.

TUBULAR, a. *tū'bū-lėr* [L. *tubŭlus,* a small pipe or tube—from *tubus,* a pipe: It. *tubulo*]: having the form of a tube or pipe; consisting of a tube or pipe. TUBULAR BOILER, a boiler made up or consisting of tubes. TUBULAR BRIDGE, a bridge consisting of a great iron tube through which a roadway passes (see below). TU'BULATE, a. *lāt,* or TU'BULATED, a. *-lā-tĕd,* made in the form of a tube or pipe; furnished with a small tube or tubular opening. TU'BULE, n. *-būl,* a small pipe or tubular body. TUBULIFORM, a. *tū-bū'lĭ-fawrm* [L. *forma,* a shape]: having the form of a tube or tubule. TUBULOUS, a. *tū'bū-lŭs,* resembling a tube; fistular; composed of tubes; in *bot.,* composed of tubular florets; having a bell-shaped mouth or border, somewhat tubular in its form.

TUBULAR BRIDGE. See BRIDGE.

TUBULIBRANCHIATA, *tū-bū-lĭ-brăng-kĭ-ā'ta:* order of gasteropodous mollusks, having two branchiæ behind the heart, the whole animal inclosed in a long shelly tube, which is sometimes straight, sometimes twisted in an irregular spiral.

TUBURAN, *tô-bô'răn,* Philippines: pueblo, province of Cebu; on the w. coast, on Tañon strait, 30 m. n.w. of Cebu. It is on the w. coast highway, and is a place of considerable importance.—Pop. 12,570.

TUCK, v. *tŭk* [Ger. *zucken,* to draw in, to shrug: Low Ger. *tukken,* to shrug the shoulders: a variant of TUG, which see]: to turn or gather up; to draw into a narrower compass; to press in or together, as the bedclothes: N. a horizontal plait or fold made in a garment to shorten it; a kind of net; *familiarly,* anything good to eat; eatables. TUCK'ING, imp. TUCKED, pp. *tŭkt.* TUCKER, n. *tŭk'kėr,* a fold of cloth for shading the bosom of a woman, above the top of the bodice; an ornamental fold to a woman's dress. TO TUCK IN, *familiarly,* to eat heartily; to devour.

TUCK, n. *tŭk* [perhaps from F. *estoc,* a rapier, stock of a tree (see STOCK): but comp. W. *twca,* a sort of knife; *twc,* a cut]: in *OE.,* a long narrow sword; a rapier.

TUCK, n. *tŭk* [contr. from *tucket*]: sound or beat, as '*tuck* of drum.'

TUCK, *tŭk,* JOSEPH HENRY: inventor: b. Dorchester, Mass., 1812, Mar. 12; d. 1904. He graduated at the Boston High School; became a watch-maker and candle-manufacturer; and was employed in England as a civil engineer 1837-65. He organized the company that laid the submarine cable between Dover and Calais 1848-9; drew the plans for excavating the Suez canal; took out 55 patents in various countries for mechanical inventions and improvements; and engaged in real-estate operations in Brooklyn 1869.

TUCKAHOE, n. *tŭk'kă-hō* [an Amer. Indian word,

signifying bread]: a curious tuberous, vegetable-like production of unknown origin, found in several parts of the United States, growing under the surface of the ground like the truffle of Europe, and sometimes called *Indian bread.* It is not to be classed with the fungi. It is almost entirely of *pectin,* and has no cellular structure. In some places it is used like arrowroot, as an article of diet.

TUCKER, *tŭk'ėr,* ABRAHAM: English author whose reputation falls short of his merits: 1705, Sept. 2—1774, Nov. 20; b. London; of good family. He studied at Merton College, Oxford, and 1726 became a member of the Inner Temple. Tucker inherited a large fortune from his father: and 1727 purchased Betchworth Castle and estate. near Dorking, Surrey. Having all the ease and quiet happiness of an English gentleman of the 18th c., he had also a frank, generous nature and a sincere love of intellectual pursuits, which prevented his misuse of his advantages. He was an industrious student, a man of keen observation, of much innocent and cheerful humor, and of methodical business habits. Tucker's great work is *The Light of Nature Pursued:* it was begun 1756, and formed the chief literary occupation of his life. It extended to seven vols., of which four were pub. during his life, under the pseudonym Edward Search. It is not a systematic treatise, but consists of a series of disquisitions on metaphysics, theology, morals, etc., all showing remarkable originality, simplicity of humor, ingenuity of illustration, and solidity of understanding. In his intellectual philosophy he professed to follow Locke. Paley, in his discussion of utilitarianism, acknowledged his obligations to Tucker. The standard edition is edited by the author's grandson, Sir Henry Mildmay.

TUCKER, *tŭk'ėr,* JOSIAH, D.D.: 1711-1799, Nov. 4; b. Laugharne, Wales: Anglican clergyman. He was educated at Oxford; became rector of St. Stephen's, Bristol, 1749, prebendary of Bristol 1756, and dean of Gloucester 1758; and greatly aided the patriot cause by openly advocating the peaceful separation of the Amer. colonies from England, and by publications setting forth the real state of political affairs in America.

TUCK'ER, ST. GEORGE, LL.D.: 1752, June 29—1828, Nov. 10; b. Port Royal, Bermuda: jurist. He removed to Va. to complete his education 1771; graduated at William and Mary College 1772; studied law and began practicing in Virginia; took part in the expedition against Bermuda 1776; commanded a patriot regt. at Yorktown; and married the mother of John Randolph. He was a judge in the Virginia state courts nearly 50 years; judge of the court of appeals 1803-11, and of the U. S. dist. court of e. Va. 1813-27; prof. in William and Mary College; and commissioner to revise the state laws.

TUCK'ER, SAMUEL: 1747, Nov. 1.—1833, Mar. 10; b.

Marblehead, Mass.: naval officer. He was bred to the sea, commanded a Boston and London merchantman when 21 years old, and was commissioned capt. in the American navy 1776, Jan. 20. That year with the armed schooners *Franklin* and *Hancock* he captured more than thirty prizes; 1777 became commander of the frigate *Boston;* 1778 took out John Adams, minister to France; and returning 1779 captured 5 prizes and the Brit. frigate *Pole,* and convoyed a fleet of merchantmen from the W. Indies to Philadelphia. He was captured while aiding the defense of Charleston 1780; paroled 1781; resumed command of his vessel and captured 7 prizes; was again captured, but escaped; and after the war received the thanks of congress. In 1813 he captured a British privateer with valuable stores off the Maine coast.

TUCK'ER, WILLIAM JEWETT, D.D., LL.D, clergyman: b. Griswold, Conn., 1839, July 13. He graduated at Dartmouth College 1861, and at Andover Theological Seminary 1866; was pastor of a Congregational church in Manchester, N. H., 1867-75, and of the Madison Square Presbyterian Church, New York, 1875-79; was professor of sacred rhetoric at Andover Theological Seminary, 1879-92; and was elected president of Dartmouth College 1892; received degree of D.D. from Dartmouth, and LL.D. from Yale; is an editor of *The Andover Review.* He published: *From Liberty to Unity* (1892) and *The Making of the Preacher* (1899).

TUCKERMAN, *tŭk'ẽr-man,* HENRY THEODORE: author: 1813, Apr. 20—1871, Dec. 17; b. Boston, Mass. He visited Italy 1833, and on his return home published *The Italian Sketch-book* (1835): he spent 1837-39 in Europe, again visiting Italy and Sicily, and there writing *Isabel, or Sicily: a Pilgrimage.* He now began to contribute to magazines sketches, essays, and literary and art criticisms: most of these he later collected and published in volumes. He wrote 2 vols. of poems and several biographies. One of his earlier works, *Thoughts on the Poets* (1846), was translated into German by Dr. Emil Müller, and pub. at Marburg 1856. His vol. *Mental Portraits* (London 1853) was revised and enlarged 1857 and then named *Essays Biographical and Critical, or Studies of Character.*

TUCKET, n. *tŭk'ĕt* [It. *toccata,* a prelude—from *toccare,* to touch (see TOUCH)]: in *OE.,* a kind of flourish or prelude on a trumpet. TUCKET-SONANCE, *-sō'nănṣ,* in *OE.,* the sound of the tucket.

TUCKING-MILL, n. *tŭk'ĭng-mĭl* [W. *tew;* Gael. *tiugh,* thick]: a fulling-mill for thickening cloth.

TUCSON, *tū'sŏn* or *tŭk'sŏn:* city, cap. of Pima co., Ariz.; on Santa Cruz river, and on the Southern Pacific railroad; 250 m. e. of Yuma. It is an agricultural, stock-raising, and mining region; has a large business in reduction of gold, silver, and copper ores; and ships

gold-dust, hides, and wool, in considerable quantities. It contains the most costly court-house in the terr., new public-school building (cost $50,000), city hall, public library, opera-house, several hotels, handsome Baptist, Congregational, Methodist, Episcopal, and Roman Catholic churches; University of Arizona, Institute of St. Joseph, Roman Catholic convent and hospital; water, ice, and gas works; 2 national banks (cap. $100,000), U. S. depository; and 2 daily and 3 weekly newspapers. An extensive system of irrigating-works has been provided in the outlying region.—Tucson was founded by the Jesuits 1560, and was the capital of the terr. 1867-77.—Pop. (1900) 7,531; (1910) 13,193.

TU'CUM AND TU'CUMA PALMS. See ASTROCARYUM.

TUCUMAN, SAN MIGUEL DE, *sân me-ghĕl' dā tô-kô-mân:* town of the Argentine Confederation, cap. of prov. of Tucuman; about 120 m. n.w. of Santiago. Tucuman has a cathedral, convents, and a Jesuits' college. It is connected by rail with Cordova and Rosario; it manufactures sugar, leather, and brandy, and has active trade in oxen and mules. Here, 1816, a congress of deputies from the various Argentine provinces proclaimed their independence of Spain. Pop. (1901) 50,000; of prov. (1900) 249,433.

TUDELA, *tô-thā'lâ* (*Tutela* of the Romans): city of Spain, prov. of Navarra; on the left bank of the Ebro (here crossed by a bridge of 17 arches); 46 m. by rail n.w. of Saragossa. It is a dull, gloomy-looking place, with narrow streets and lofty houses; but the promenades along the river are very fine, as are also the *plazas,* or public squares. Tudela is the seat of a bishopric; has a Gothic cathedral, a medical college, and manufactures of coarse woolen cloths, soap, earthenware, etc.; and has active trade in the products of the district. Pop. about 10,000.

TUDOR, *tū'dėr:* family of Welsh extraction, which occupied the throne of England 1485-1603. In the Welsh language, Tudor is the equivalent of Theodore. Owen Tudor, first of the race known in history, is said to have descended from the ancient Welsh princes; but little is known of his origin, except that his father had to quit Wales on a charge of murder, and was outlawed. Owen Tudor himself seems to have been a brewer at Beaumaris, in Anglesey; afterward a retainer in the suite of the bishop of Bangor; and to have fought at Agincourt. His dancing at a court pageant is said to have ingratiated him with Catharine of Valois, widow of Henry V., who appointed him clerk of the household. His relations with Catharine roused public indignation, and the queen was compelled to take refuge in a convent at Bermondsey, where she died. Tudor was sent to Newgate, but succeeded in escaping and obtaining two audiences of the young king, Henry VI., who afforded him protection and conferred on him the lieutenancy of Denbigh. Two sons

had been born to him by the queen. On the elder, Edmond, the king bestowed the earldom of Richmond; and on the younger, Jasper, the earldom of Pembroke. The Earl of Richmond married Margaret, daughter and heiress of John Beaufort, Earl of Somerset, whose father was an illegitimate son of John of Gaunt by Katherine Swynford. Henry, Duke of Richmond—sole issue of Richmond and the heiress of Somerset—having been invited from abroad to deliver England from Richard III., ascended the throne after Richard's death at Bosworth, as Henry VII. The partisans of the House of Lancaster supported him on the extinction of the lawful descendants of John of Gaunt; and by his marriage with Elizabeth, eldest daughter of Edward IV., and representative of the House of York, he was considered to have united the factions of the White and Red Rose. Five sovereigns of the House of Tudor successively occupied the throne—Henry VII., Henry VIII., Edward VI., Mary, and Elizabeth (see these titles). From Elizabeth, the last of the line, the crown passed to James VI. of Scotland, of the House of Stuart (q.v.), in virtue of his descent from Margaret Tudor, daughter of Henry VII. and queen of James IV. of Scotland. Strength of will was the prominent characteristic of the sovereigns of the House of Tudor; their rule, generally prosperous, was far more arbitrary and despotic than that of the Plantagenets. Parliament was in many cases but the exponent of the royal will, and taxes were frequently exacted, and penal statutes dispensed with, by the prerogative alone. The condition of England under the Tudors differed from despotic monarchies chiefly in the important respect that the sovereign had no standing army. The Tudor monarchs exercised a remarkable influence on ecclesiastical affairs: under their rule the Reformation took place, and the Anglican Church was developed.

TUDOR, *tū'dėr,* WILLIAM: 1750, Mar. 28—1819, July 8; b. Boston: lawyer. He graduated at Harvard 1769; was admitted to the bar 1772; was judge-advocate on Washington's staff 1775-78; member of both houses of the Massachusetts legislature; secretary of state 1809-10; a founder of the Massachusetts Historical Society; and vice-president of the Massachusetts Society of the Cincinnati.

TU'DOR, WILLIAM: author: 1779, Jan. 28—1830, Mar. 9; b. Boston; son of William Tudor (1750-1819). He graduated at Harvard 1796; engaged in mercantile business; made several trips to Europe; spent some time in literary pursuits in France and Italy; and, returning to Boston, founded the Anthology Club, and was principal writer on its organ, *The Monthly Anthology,* 1803-11. He was also a founder of the Boston Athenæum, projector and first editor of *The North American Review,* and originator of the Bunker Hill monument. In 1823-27 he was United States consul at Lima, and from 1827 till

his death United States chargé d'affaires at Rio Janeiro. He published several works and left much manuscript.

TU'DOR STYLE: in *arch.*, indefinite term applied to the late Perpendicular and the transition from that to Elizabethan.

TUEDIAN, a. *tū-ē'dĭ-an:* of or belonging to the region adjacent to the Tweed.

TUESDAY, n. *tūz'dā* [AS. *tywes-dæg,* Tuesday—from *Tyw,* the god of war; *dæg,* day: in Scand. myth., *Tuisco,* the god of war: Icel., *tysdagr:* Sw. *tisdag:* Dan. *tirsdag*]: the third day of the week. See WEEK.

TUFA, n. *tū'fă,* or TUFF, n. *tŭf* [It. *tufo,* soft sandy stone—from L. *tofus,* tufa: Sp. *toba:* F. *tuf*]: originally a light porous rock composed of cemented scoriæ and ashes ejected from a volcano; now any porous vesicular compound. TUFACEOUS, a. *tū-fā'shŭs,* pertaining to or consisting of tufa, or resembling it.

TUFT, n. *tŭft* [F. *touffe,* a tuft, clump of trees: Ger. *zopf,* a tuft of hair: Icel. *toppr,* the summit, tuft of hair: W. *twb,* a round lump; *twff,* a tuft (see also TOP 1)]: a collection of small things forming a knot or bunch, as of threads or feathers; a clump; a cluster; a head of flowers; a little bundle of leaves, hairs, or the like: V. to adorn with a tuft or with tufts. TUFT'ING, imp. TUFT'ED, pp.: ADJ. growing in tufts or clusters; adorned with a tuft or tufts. TUFTY, a. *tŭf'tĭ,* abounding with tufts; growing in clusters. TUFT-HUNTER, one who is very assiduous in courting the acquaintance of persons of rank —the phrase originating from the circumstance of young noblemen being entitled to wear gold tassels in their caps at Oxford University.

TUFTS, *tŭfts,* COTTON: 1734, May 30—1815, Dec. 8; b. Medford, Mass.: physician. He graduated at Harvard 1749; studied medicine, and settled in Weymouth to practice; was an original member of the State Medical Society, and a founder of the Academy of Arts and Sciences; became a member of the general court, state councilor, state senator, and member of the convention that ratified the federal constitution; and was author of the instructions to the representatives of Weymouth to oppose the Stamp Act.

TUFTS COLLEGE, at Tufts College Station, near Medford, Mass. It was founded by members of the Union Church, but is nonsectarian in its policy. Tufts College was chartered by the legislature of Massachusetts 1852, and was opened for reception of students in 1855. It now includes the following departments: (1) College of Letters; (2) Divinity School, established in 1882; Medica School, opened in 1893; Dental School, opened in 1899. The last two are located in Boston. The policy of the college is broad and the College of Letters includes special courses in engineering, science, and confers degrees of A.B., PH.B. and B.S.; the college also offers

degrees of A.M. and PH.D. for graduates. Tufts College is open to women and there are two dormitories on the campus for their use, there being three dormitories for men. Other buildings are the Barnum Museum, given by P. T. Barnum; Minor Hall, given by Rev. A. A. Minor, for the Theological School; the Goddard chapel; the library, etc.; in all 17 buildings. There are a large number of scholarships. The college numbers 950 students (including the summer school) and 175 faculty.

TUG, n. *tŭg* [Ger. *zug*, a pull, a tug: Icel. *tog*, a tow-rope: O. Dut. *tucken*, to allure, to entice: AS. *teon;* Ger. *ziehen;* Goth. *tiuhan*, to draw (see also TUCK 1)]: a pull with strong effort; a small steam-vessel used to tow or pull ships out of or into a harbor or dock; something used in tugging or pulling; one of the straps or chains by which a horse draws a vehicle; a trace: V. to pull or draw with considerable effort; to pull with continued exertion; to labor hard; to drag. TUG'GING, imp.: N. laborious pulling. TUGGED, pp. *tŭgd*. TUG'GINGLY, ad. *-lĭ*. TUG'GER, n. *-gẽr*, one who tugs. THE TUG OF WAR, the supreme effort in any struggle; also, a game in which the ends of a rope are held by rival parties who try to draw each other over a line.

TUGBOAT: a small steam-vessel, powerfully constructed, used for towing large vessels in and out of harbors, and in rivers and canals. More than 1,000 of these are employed in New York harbor alone and are classed by boatmen under various names. Tugs are also of great service in forcing a channel through the ice; in rescue work if there is a wreck or a ship on fire; in transporting car floats for the railroad companies and in towing great rafts of logs.

TUGENDBUND (German for 'league of virtue'): a union ostensibly for the promotion of educational and social reforms, which was organized in Prussia in 1808, the real purpose being to free North Germany from the intolerable yoke of Napoleon. The Prussian government was apprehensive that the Tugendbund might involve it in further difficulty with the French emperor, then virtually master of Germany, and suppressed the movement in 1809.

TUGUEGARAO, *tô-gā-gä-rä'ō*, Philippines: pueblo, capital of the prov. of Cagayán, Luzon; within a few miles of the Grande de Cagayan river, 215 m. n.n.w. of Manila. It is on the main highway to Manila and is the centre of a fertile agricultural region. It is well built, many of the houses being of stone; it has a large public square, a church, court-house and town-hall. Pop. 16,820.

TUILERIES, *twē'lë-rĭz* [F. *twēl-rē:* named from the 'tile-works,' which originally occupied the site]: previous to 1871 the royal and imperial palace at Paris, situated almost in the centre of the city on the n. bank of the Seine. It was founded in 1564 by Catherine de Medici, wife of Henry II. Later monarchs extended it and

altered the plans, until it became a large, complex structure, but with little architectural interest. It was stormed and sacked by the Paris mob in each of the revolutions, but was restored, and served as the residence of all the monarchs of the 19th century, including the two emperors. In 1871, however, it was set on fire by the Communists, and almost totally destroyed. Only the two eastern wings connected with the Louvre remain. The rest of the site has been converted into a public garden.

TUILYIE, or TUILZIE, or TULYE, n. *tôl'yĕ* [OF. *touiller,* to mix in a confused manner]: in *Scot.,* a quarrel; a broil: V. to quarrel; to squabble.

TUITION, n. *tū-ĭsh'ŭn* [L. *tuitĭō* or *tuitĭōnem,* a taking care of, a guarding—from *tuĕor,* I look at or guard]: *originally,* superintending care, as over a pupil or ward—hence, instruction; the act or business of teaching. TUI'TIONARY, a. *-ėr-ĭ,* pertaining to tuition.

TUKE, DANIEL HACK: English physician: b. York 1827, Apr. 19; d. London 1895, Mar. 5. He studied at St. Bartholomew's Hospital College, London, and was graduated from the University of Heidelberg in 1853. He afterward made extensive tours on the continent, visiting the principal asylums for the insane, and recording his observations, a practice he continued throughout his life. Upon his return from his first tour abroad he became visiting physician to the York Retreat for the Insane, but was compelled to retire in 1859 because of failing health. In 1875 he removed to London and until his death was engaged as consulting physician in mental diseases. He was associate editor of *The Journal of Mental Science* in 1878-92, collaborated with J. C. Bucknill in Writing *A Manual of Psychological Medicine* (1857), and also wrote: *Illustrations of the Influence of the Mind on the Body* (1872); *Insanity in Ancient and Modern Life* (1878); *History of the Insane in the British Isles* (1882); *Dictionary of Psychological Medicine* (1892); etc.

TUKE, HENRY SCOTT: English writer and religionist: b. York 1756; d. there 1814. He was a distinguished minister of the Society of Friends and wrote several works which are considered standard authorities in that denomination. Among them are: *The Faith of the People Called Quakers in our Lord and Saviour Jesus Christ, Set Forth in Various Extracts from Their Writings* (1801); *The Principles of Religion as Professed by the Society of Christians Usually Called Quakers, Written for the Instruction of Their Youth and for the Information of Strangers* (1805); and *Biographical Notices of Members of the Society of Friends* (1813).

TUKE, WILLIAM: English philanthropist: b. York 1732, Mar. 24; d. there 1822, Dec. 6. He was devoted to mercantile pursuits, principally in the tea and coffee trade. Belonging to the Society of Friends, his attention was called, through the death of a fellow believer con-

fined in the York County Asylum, to the necessity of ameliorating the condition of the insane. With his son Henry, Lindley Murray, and other Friends, he secured funds for the opening of the York Retreat in 1796. In this institution began in England the modern humane methods of treatment, a reform that, unknown to Tuke, Pinel was carrying out contemporaneously in Paris. Inmates were no longer kept in chains; restraints and irksome discipline were removed; quiet surroundings with some industrial occupation were provided. After his death important legislation on the treatment of the insane was the direct result of his reforms.

TULA, Mexico: a town in the state of Hidalgo, situated on the railroad, 40 m. w. of Pachuca. It has a church and convent built by the early Spanish settlers, and in the neighborhood are extensive ruins supposed to be remains of the old Toltec capital. Pop. 5,000.

TULA, Russia: (1) capital of Tula, on the Upa, 120 m. by rail s. of Moscow. It is an important manufacturing place, has churches, museum, arsenal, and government offices, and an ancient Kreml. Its industrial works include a large gun factory, sugar refinery, dye-works, factories for bicycles, small arms, tea-urns or *samovars,* harmoniums, bells and mathematical instruments, besides manufactures of soap, candles, sealing wax, etc. Pop. 115,000.

(2) Tula, is a government of central Russia, whose area comprises 11,722 sq.m. Its surface is mostly flat, and almost everywhere capable of cultivation. There are extensive forests, and the principal streams are the Oka, Upa, and Don. Canals connect the region with the Baltic, Black and Caspian seas. Agriculture and stock raising are important. Iron is extensively manufactured. Pop. 1,600,000.

TU'LA-METAL: peculiar alloy of silver, with small proportions of copper and lead; manufactured at the imperial metal-works at Tula, in Russia, and used for making the famous Russian snuff-boxes, erroneously said to be of platinum.

TULANE, Paul: American philanthropist: b. Princeton, N. J., 1801, May 6; d. there 1887, May 27. He came of a distinguished family of French jurists, the probate judgeship of Tours having been in the Tulane family for 150 years. His father, Louis Tulane, came to America about 1795 and settled on a farm near Princeton, N. J., where his family lived for many years. Paul's early education was limited to a common school training, and he worked on the farm and, later, assisted in keeping a small grocery. About 1819 he went to New Orleans, settled there, and with the aid of a French cousin, then in America, opened a general merchandise store in 1822. By 1828 he had amassed a fortune of $170,000, a large amount at that time. He continued in a prosperous mercantile career until 1858, when he retired from active

business, purchased a residence in Princeton, and divided his time between it and New Orleans for many years, continually increasing his property both in the Crescent City and at the north until his death. His interest in education appears to have been first awakened during the trip with his cousin in 1819 on observing several young Creoles from New Orleans on their way to Transylvania University, in Kentucky. He seems then to have been struck with the fact of the lack of educational advantages for these young people at their home. This interest bore fruit in the fact that, entirely without solicitation, he formed in 1882 a group of friends into a body which incorporated itself as 'The Board of Administrators of the Tulane Education Fund.' To them he gave in trust a considerable property, without specific instructions except that the fund donated was 'for the promotion and encouragement of intellectual, moral, and industrial education among the white young people in the city of New Orleans, state of Louisiana.' By contract with the state, securing thereby exemption from taxation on its property, the board thus formed took over the University of Louisiana, founded in 1832, the name of which was then changed to Tulane University of Louisiana (q.v.). His first gift for educational purposes in New Orleans consisted of his New Orleans real estate, valued at about $363,000. By subsequent gifts his endowment was raised to a total of $1,100,000.

TULANE UNIVERSITY OF LOUISIANA: located in New Orleans. This institution, under its present name, was created by act No. 43 of the legislature of 1884. Its oldest department is the Medical College, which was organized as a private enterprise in 1834, and which was the first medical college in the southwest. To this college the most distinguished physicians of that day gave their services; such men as Cenas, Harrison, Hunt, James Jones, Riddell, and Warren Stone. As yet there was no academic or law department, but in 1845 the first democratic constitutional convention that assembled in the state provided for the establishment of an institution to be known as the University of Louisiana, which should embrace as one of its departments the medical college already in existence, together with a department of law, a department of natural sciences, and a department of letters. The state refused to bind itself to support the new university, but in the years following, the legislature appropriated about $100,000 for the equipment of the medical department and for a building to house it. The plans of the convention for the other departments were not realized until 1847. The first meeting of the board of administrators took place 1847, Apr. 27. On May 4 of the same year, the board decided that law lectures should begin in November, with the following professors: H. A. Bullard, Richard H. Wilde, Theo. H. McCaleb, and Randell Hunt. On the 1st of June, 1847, a committee was appointed to report on the organization of a de-

partment of letters and of natural sciences. The first president of the university, elected 1847, July 21, was Dr. Francis L. Hawks, of North Carolina. In the same year the medical college gave to the law faculty its building (which stood on the present site of the Crescent Theatre), and removed to its new building (on the site of the present Tulane Theatre). The academic department existed only as a high school until 1851, when the college proper was opened with 12 freshmen and 2 sophomores. The medical college was the most successful department down to 1861, when the Civil war closed the university. At the close of the conflict the law and medical colleges were reopened, but the academic department had to await until the close of reconstruction. In November, 1878, the academic department was revived under Dean Richard H. Jesse. Beginning in 1879, the state made an appropriation of $10,000 a year for its support, the first regular subsidy it had ever received. Private munificence, however, was now to take the place of state appropriations. In 1882 Paul Tulane, a former merchant of New Orleans, made a large donation for the higher education of 'the white young persons' in the city of New Orleans. This donation was augmented until it amounted to more than a million dollars. The acceptance of this gift was followed by the absorption of the old University of Louisiana in the new Tulane University of Louisiana, which was effected by Act 43 of the general assembly of 1884, and which has been ratified by the present constitution (1898). As a *quasi* state institution the university is exempted from all taxation on its property, and in recognition thereof it remits all claim to the appropriation of $10,000, and gives a free scholarship to every legislative and senatorial district in the state. To the presidency of Tulane University the board called a distinguished soldier and scholar, Wm. Preston Johnston, who labored until his death, in 1898, to enlarge the usefulness of the institution. He was succeeded in 1900 by Dr. Edwin A. Alderman, who, in turn, was succeeded in 1905 by Dr. E. B. Craighead. In 1886 Mrs. Josephine Louise Newcomb donated to the Tulane educational fund the sum of $100,000, 'to be used in establishing the H. Sophie Newcomb Memorial College, in the Tulane University of Louisiana, for the higher education of white girls and young women.' This endowment, to which Mrs. Newcomb added largely during her life and in her will, has enabled the board to offer to young women the same advantages formerly given only to men. In 1891 Mrs. Ida G. Richardson presented the medical college with a splendid modern building, equipped with every needed appliance for instruction in medicine and pharmacy. In 1900 Mrs. Caroline Tilton gave to the university the library building. In the year 1894 the academic department was moved from its old contracted quarters to a splendid site on St. Charles avenue, opposite Audubon park.

TULCHAN, n. *tŭl'chăn*, the *ch*, as in *loch*, is *guttural* [Gael. *tulachan*, a sham calf or bishop]: in *Scot.*, an undressed calf's skin stuffed with straw, and set beside a cow to cause her to give her milk. A TULCHAN BISHOP, in *Scot.*, in Reformation times, one who received the episcopate on condition of assigning the temporalities of the see to a secular person.

TULÉ: the Spanish-American name of a variety of the bulrushes, *Scirpus lacustris* and *S. tatora*, so common in the overflowed lands of the southwestern United States that those districts are called tulé lands. *S. lacustris* is a tall, large, smooth-stemmed rush with an umbel of flower spikelets, and with the leaves reduced to mere sheaths. It has a thick fleshy perennial rootstock, eaten by the aborigines, and which when sun-dried and powdered is said to keep well, and to be of good taste. Tulé seeds, also, are eaten; and the stems are woven into mats and baskets, and, like reeds, are used in great bunches to form the curious craft called balsas.

TULIP, n. *tū'lĭp* [F. *tulipe;* It. *tulipa*, a tulip—from Pers. *dulband*, a turban—from its likeness to a turban]: a bulbous plant cultivated for the beauty and variety of its flowers, of the genus *Tulipa*, ord. *Liliăcĕæ;* the tulip of the gardens is *Tulĭpa Gesnerĭāna*.—The Tulip has an inferior bell-shaped perianth, of six distinct segments, without nectaries; a sessile three-lobed stigma, a three-cornered capsule, and flat seeds. The bulb is fleshy and covered with a brown skin. About 30 species of tulips are known, mostly natives of warmer parts of Asia. The most famous of all Florists' Flowers is the GARDEN TULIP (*T. Gesneriana*), 18 in. to 3 ft. high, with smooth stem, bearing one erect, large flower; the leaves ovate-lanceolate, glaucous, and smooth. The tulip is a native of the Levant; was brought from Constantinople to Augsburg by Conrad Gesner 1559, and was rapidly diffused throughout Europe. The varieties in cultivation in Europe and America are innumerable. For the tulip mania of the 17th century, in Holland, see FLORISTS' FLOWERS. The tulip is still sedulously cultivated in Holland, especially at Haarlem, whence bulbs are largely exported. It is prized merely for the size and beauty of its flowers; its odor being not very pleasant. Tulips succeed best in a light, dry, and somewhat sandy soil. Bulbs are planted in the end of October, or beginning of November, and the flowers are produced early in summer. Tulips are propagated by offset bulbs, and new varieties are raised from seed.—Another species of tulip cultivated in gardens is the SWEET-SCENTED TULIP, or VAN THOL TULIP (*T. suavcolens*), which has a short, hairy stem, and yellow or red flowers, inferior to those of the common Garden Tulip in beauty, but prized for fragrance and for appearing more early in the season; it is cultivated often in pots in windows. It is a native of s. Europe. The WILD TULIP (*T. sylvestris*) is a native of

TULIPS.

many parts of Europe and Asia: it is common in the woods and vineyards of Germany and s. Europe. It has a slender stem, narrow lanceolate leaves, and a somewhat drooping, fragrant, yellow flower. It develops offset bulbs at the end of fibres thrown out from the root, at some distance from the parent plant. Its bulbs are eaten in Siberia, though bitterness and acridity characterize the bulbs of this genus.

TU'LIP-TREE (*Liriodendron tulipifera*): beautiful tree of nat. ord. *Magnoliaceæ*, native of the United States, having a stem sometimes 100-200 ft. high and 9 ft. thick in the w. states. The leaves are roundish, ovate, with two lobes near the base and two at the apex, truncated, with a broad shallow notch between. The flowers are solitary at the extremities of the branchlets; they resemble tulips in size and appearance, and are greenish-yellow, marked with orange. The scale-like pistils cohere in a cone, separating when ripe, and falling away like the key-seeds of the maple. The bark has a bitter, aromatic taste, and, like that of all the *Magnoliaceæ*, contains a bitter principle, *Liriodendrin*. The tulip-tree is found from s. New England to Italy and south. It is one of the most beautiful ornaments of pleasure-grounds, wherever it grows and flowers well. It is now plentiful in many parts of s. Europe. In some parts of the basin of the Mississippi, it forms considerable tracts of the forest. The timber is easily wrought, takes good polish, and is much used for many purposes. The heartwood is classed among light woods, is easily worked, has a compact fine grain, and takes a high polish; when perfectly seasoned, it is durable and resists insects' attacks, but is likely to warp and shrink if not well dried. The color may be either white or yellow, and the wood is known as white or yellow poplar, the latter variety being the better. At one time used greatly for house-building, furniture, wooden utensils and many other purposes, on account of its lightness and strength; it is also valuable for carriage panels. Indians were said to have wrought it into long canoes, so regular and light were the trunks. An infusion of the bark when added to an equal quantity of dogwood is reckoned as a remedy for intermittent fevers, when alone as a substitute for cinchona and as a gentle cathartic. Many fossil species have been found, representatives of the *Liriodendron* type, of which it alone survives.

TULL, JETHRO: English agriculturist: b. Basildon, Berkshire, 1674; d. near Hungerford, Berkshire, 1741, Feb. 21. He was educated at Oxford, and was called to the bar in 1699. He appears to have had political ambitions, but ill health compelled their abandonment and after an extended tour of Europe he settled on his estate and devoted himself to agriculture. In 1809 he removed to his farm near Hungerford, which he christened 'Prosperous Farm,' and continued his experiments. He intro-

duced the system of planting in rows and pulverizing the soil between them, but made the serious mistake of considering the finely pulverized earth and moisture sufficient for the growth of the plants and dispensed with fertilizing the soil, a system which involved him in serious losses. He invented the drill-plow and published *New Horse-Hoeing Husbandry* (1733), a work which was long an authority in England.

TULLAMORE, *tŭl-la-mōr':* one of the capitals, and now the assize town, of Kings county, Ireland; on the Grand canal, 59 m. w.s.w. of Dublin, with which it is connected by rail. It stands on what may be called a fertile island of the great Bog of Allen, and has within recent years risen into importance. Its central position gives it command of the inland traffic of a large district. A trade in grain and agricultural produce is carried on with Dublin by the canal. There are a large distillery and extensive breweries and several tanneries; also a busy cattle-trade. The schools, conventual and national, are excellent, and numerously attended. There are a jail and court-house, barracks, Roman Catholic and Protestant churches, etc. A weekly newspaper is published. Within a few miles is the extensive Jesuit college of Tullabeg, which receives above 150 pupils. Pop. 4,639, mostly Roman Catholics.

TULLE, n. *tôl* [F. *tulle*—said to be so called from the town of *Tulle*, in France]: a delicate kind of silk net or lace, used for women's veils, for dressing caps, etc.

TULLE, *tül:* town of France, department of Corrèze; at the embouchure of the Solane into the Corréze. It is for the most part poorly built, but has some fine promenades, excellent quays and bridges, Gothic cathedral, episcopal palace, theological seminary, communal college, industrial college, public library, and theatre. One of the suburbs of Tulle, called Souillac, is a national military manufactory, and the town is otherwise notable for manufactures of leather, paper, cards, lace (known as *Point de Tulle*), liqueurs, and iron-mongery. Some say that Tulle owed its origin to a Roman fort called *Tutela;* and in the vicinity are certain undoubted Roman remains: others think it dates from the 4th century. Pop. 20,000.

TULLOCH, *tŭl'ok,* JOHN, D.D.: 1823-1886, Feb. 13; educator and author: b. at Bridge of Earn, Perthshire, Scotland. He was educated at the University of St. Andrews; was ordained a clergyman of the Church of Scotland (Presb.) 1845; studied philosophy and speculative theology in Germany; became parish clergyman at Kettins, Scotland, 1849; and from 1854 till his death was professor of divinity and principal of St. Mary's College, St. Andrews. He visited the United States 1874.—Tulloch was author of many works, including *Leaders of the Reformation, English Puritanism and Its Leaders,* and *Rational Theology and Christian Philosophy of the Seventh Century.* The last is his most important work. His

writings are valuable especially for their sketches of leaders in the great movements in the church—such as the Reformation and Puritanism. Next to Dr. Robert Lee, Tulloch has done more than any other man to broaden the Scottish national church—insisting on the necessity of comprehensiveness of varying evangelical opinions and tendencies; and on liberty in all subscriptions to creeds, as binding not in all details but only as to general substance and spirit. The evident need of this provisional step in the direction of liberty has since indicated to many minds the fact that creeds cannot be relied on as the sure defense of doctrine.

TULLUS HOSTILIUS, *tŭl'lŭs hŏs-tĭl'ĭ-ŭs:* third legendary king of Rome: d. B.C. 638 (reigned B.C. 670-638). According to the legends (doubtful authority for dates, events, etc.), he succeeded Numa Pompilius on the throne; and made the famous arrangement, by the combat of the Horatii with the Curiatii, for decision of the question of supremacy between Rome and Alba, which resulted in the favor of Rome: he conquered Fidenæ and Veii; destroyed Alba, and removed the inhabitants to Rome, giving them Mount Cælius to dwell on; and carried on war against the Sabines. As he grew old, he became more pacific, and turned to the worship of the gods; but his negligence had too long provoked them to be forgiven; so that, when he wished to inquire of Jupiter Elicius, the god consumed Tullus Hostilius and his house with fire.—According to Niebuhr, Arnold, etc., glimpses of distinct personality appear in this legend of Tullus Hostilius, by which it makes nearer approach to history than do the legends of Romulus and Numa, which are merely personifications of the two principal stages of a nation's growth. Tullus Hostilius may be taken as shadowing the first extension of Roman territory beyond the city.

TUMBLE, n. *tŭm'bl* [F. *tomber;* It. *tombolare;* Icel. *tumba,* to fall: AS. *tumbian,* to tumble, to dance: Dut. *tuimelen;* Sw. *tumla;* Dan. *tumle,* to tumble]: a fall: V. to fall; to come suddenly to the ground; to rumple; to toss; to fall in quantities and tumultuously; to throw down; to roll or turn over; to throw somersets and perform other contortions, especially said of acrobats. TUM'BLING, imp. *-blĭng:* ADJ. rolling: N. the act of falling; the performance of certain actors in a circus. TUMBLED, pp. *tŭm'bld.* TUM'BLER, n. *-blėr,* one who amuses the public by placing himself in various postures; a kind of latch in a Lock (q.v.); a drinking-glass—originally with pointed or round bottom so that it could not be set down without falling—hence it was necessary to empty it first; in modern usage, a drinking-glass without a stem or foot; a variety of the domestic pigeon which tumbles or turns over in its flight; a kind of dog. TUM'BLERFUL, n. a quantity sufficient to fill a tumbler.

TUMBREL, n. *tŭm'brĕl,* or TUM'BRIL, n. *-brĭl* [OF

tomberel; F. *tombereau,* a dung-cart—from *tomber,* to fall (see TUMBLE)]: a covered cart used to convey tools, ammunition, etc., in a military train; a cart or truck which may be tumbled or tilted up; a dung-cart; a ducking-stool; a frame or crib, made of willows and the like, for containing hay and other food for sheep.

TUMEFY, v. *tū'mĕ-fī* [F. *tuméfier*—from L. *tumefacĕrĕ,* to cause to swell or puff up—from *tumĕō,* I swell; *facĭō,* I make]: to cause to swell; to swell; to rise in a tumor. TU'MEFYING, imp. TU'MEFIED, pp. *-fīd.* TU'MEFAC'TION, n. *-făk'shŭn* [F.—L.]: act of swelling; a swelling; a tumor. TUMESCENT, a. *tū-mĕs'sĕnt,* being or growing tumid. TUMES'CENCE, n. *-sĕns,* tumefaction.

TUMID, a. *tū'mĭd* [L. *tumĭdus,* swollen, protuberant—from *tumĕō,* I swell]: swollen, inflated or distended; protuberant; swollen in sound or sense; absurdly sublime; pompous; bombastic. TU'MIDLY, ad. *-lĭ.* TU'MIDNESS, n. *-nĕs,* or TUMIDITY, n. *tū-mĭd'ĭ-tĭ,* the state or quality of being tumid.

TUMOR, n. *tū'mėr* [F. *tumeur*—from L. *tumor* or *tumōrem,* a swelling—from *tumĕō,* I swell]: a swelling or enlargement of any part of the body caused by morbid growth. TU'MORED, a. *-mėrd,* swelled; distended.—In a general sense, any swelling may be called a tumor; more specifically, the word is used as a synonym for neoplasm or new growth, meaning a development of a mass of cells, without any direct inflammatory cause, and performing no physiological function. Tumors are naturally classified according to their structure, which corresponds to that of normal tissues, nearly all forms of normal tissues being represented in tumors. Thus the essential difference between the cells of a tumor and those of a normal organ is that the former are not properly combined with cells of other kinds so as to perform useful roles, and that they tend to proliferate to an inconvenient or dangerous degree.

Cysts are usually included among tumors, though not exactly fulfilling the above definition. They consist of a wall, usually of fibrous tissue, inclosing a soft or liquid mass. A wen is a 'retention cyst' caused by a stoppage of a sebaceous gland, the unctuous sebaceous secretion accumulating so as to form a tumor even as large as a child's head. Ovarian cysts, which may attain an enormous size, are formed by a somewhat similar accumulation. They are almost always multilocular (that is, subdivided into many chambers) and filled with gelatinous material. Large unilocular cysts, filled with clear watery serum, may form in the layers of the broad ligament of the uterus and may be mistaken for ovarian cysts. Dermoid cysts, most commonly found in the ovary, contain imperfectly formed bone, sebaceous material, teeth, hair, etc., and are supposed to be due to the inclusion of misplaced embryonal cells in a developing organ.

The names of true tumors are formed by adding the

Greek suffix-*oma* (swelling) to the name of the tissue represented. Thus we have fibroma, of fibrous tissue; myxoma, of mucoid tissue; glioma, of the peculiar delicate connective tissue of the spinal cord and brain; lipoma, of fatty tissue; osteoma, of bony tissue; chondroma, of cartilaginous tissue; angioma, consisting of blood vessels of various sizes; lymphangioma, of lymphatic vessels; lymphoma, of lymphoid tissue; neuroma, of true nerve tissue, though most so called neuromata are fibroid tumors; papilloma, or wart, of the combined tissues of a papilla of the skin; adenoma, of glandular epithelium. All the foregoing are essentially *benign*, that is, not tending to a fatal issue except from some such accident as pressure on the air passages or rupture and hemorrhage or breaking down into an abscess with resulting septicæmia, etc. Corresponding somewhat to lymphoma, are various forms of sarcoma; corresponding to papilloma, but differing in the tendency to grow internally rather than externally, is the epithelioma or cancer of external epithelium; and to the adenoma is the true glandular circinoma. These three forms of neoplasm are spoken of as malignant, from their tendency to rapid growth and exhaustion of vitality. It must be borne in mind, however, that a tumor differs from an organ and a malignant tumor from a benign growth, not so much from any obvious difference in the cell constituents as in the tendency to form useless and wasteful masses of flesh.

All tumors necessarily involve some admixture of supporting, fibrous tissue, but there is often a truly mixed tumor. Thus myxoma and neuroma are seldom of pure type, but are more correctly described as myxo-fibroma or neuro-fibroma. Gliomata are, by some, considered a form of sarcoma, though it is doubtful whether the fatal tendency manifested by them is intrinsic or due to the accident of location. Osteo-sarcoma is a common combination, and the ordinary scirrhous cancer might, analogously, be termed a fibro-carcinoma. In general, fibrous and fatty tumors are the least dangerous, and the more fibrous tissue a malignant tumor contains, the slower is its growth.

The cause of tumors is almost unknown. Dermoid and some other cysts, as well as the rare tumor representing striped muscle, are congenital. Epithelioma and carcinoma are not often found before the age of forty; sarcoma is rather a disease of childhood. Epithelioma, especially of the face, is often traced to repeated irritation of a sore or to malignant degeneration of a wart. It is possible that malignant tumors have a germ origin. Treatment of all forms of tumors may be summed up in the one word *removal*. The indication for removal is especially urgent in malignant disease, when the only hope is from prompt and radical operation.

TUMP, n. *tŭmp* [W. *twmp*, a round mass or heap, a hillock]: a little hillock; a knoll: V. to throw up the

earth around a tree so as to form a hillock. TUMP'ING, imp. TUMPED, pp. *tŭmpt.*

TUMULAR. See under TUMULUS.

TUMULT, n. *tū'mŭlt* [F. *tumulte*—from L. *tumultus*, disturbance, agitation—from *tumĕō*, I swell: It. *tumulto*]: the commotion of a multitude of people, with great noise and uproar; wild disorder; uproar; disturbance. TUMUL'TUARY, a. *-tū-ėr-ĭ*, disorderly; agitated; confused and restless. TUMUL'TUARINESS, n. *-nĕs*, lawlessness, turbulence. TUMUL'TUOUS, a. *-tū-ŭs*, conducted with confusion and noise; disorderly; turbulent; lawless. TUMUL'TUOUSLY, ad. *-lĭ*. TUMUL'TUOUSNESS, n. *-nĕs*, the state of being tumultuous; disorder. TUMULTUOUS ASSEMBLAGE (see RIOT).—SYN. of 'tumult': commotion; uproar; ferment; turbulence; confusion; bluster; hubbub; noise; stir; brawl; riot; bustle; clamor; outcry; exclamation; shouting; bawling;—of 'tumultuous': boisterous; irregular; noisy; confused; violent; agitated; disturbed; seditious; riotous.

TU'MULUS: an artificial mound, raised, as a rule, over the tomb of some prominent person. The custom appears to have been universal in the early historic period, and is clearly traceable to prehistoric times. As it required the use only of earth, and of rude stones for a sepulchral chamber, it was the only feasible method by which races in a low state of development could commemorate their dead, and partly for a similar reason, partly from traditional usage, the tumulus was continued after the use of metals had made it possible to construct sepulchral monuments of cut stone. In ancient as in modern times, where large numbers of dead were heaped together, and it was desired to honor them all, the tumulus was the only monument that could be conveniently provided. The vast grave at Salisbury, North Carolina, in which thousands of Union dead are interred, is a tumulus as much as any of the great burial mounds of the ancients.

The Bible and Homer give examples of tumuli. They are found in North America, Mexico, Central and South America, in Great Britain, and Scandinavia, in Asia and Africa. They are not in all instances burial mounds. The Bible, in Genesis xxxi. 44-55, relates the erection of a 'heap,' or tumulus, as evidence of an agreement as to boundary between Laban and Jacob. It is probable that some of the mounds were ancient forts. That at Silbury Hill, Wiltshire, England, 170 ft. high, may not have been a sepulchre, and some of the American mounds were sacrificial, and others may have been places of defense. Indeed, all three uses—sepulchral, sacrificial, and defensive—may have been included in a mound. It is also certain that some tumuli are simply residential ruins, the crumbled remains of adobe dwellings, or, in the desert regions of Asia and Africa, sand heaps rising as the sole memorials of vanished and once populous cities. See MEGALITHIC STONES; MOUND-BUILDERS.

TUMUT, *tū'mŭt,* Australia: the federal capital of the commonwealth, selected by the royal commission in 1904, a picturesque hill-town in New South Wales, 318 m. by rail from Sydney, 389 m. from Melbourne, or about 12 hours' journey from either city. It is situated in a mountain valley 1,050 ft. above sea-level, on the slope of a hillside rising from the south bank of the river Tumut, from which the town takes its name. The Tumut does not dry up like most Australian rivers, during the hot weather, but remains at continual high water mark owing to the melting snows of the neighboring mountains, the loftiest of which is Mount Kosciusko, the culminating point of the entire continent. The climatic conditions are those of a sanatorium, as compared with Sydney and Melbourne, while the abundance of water renders the vicinity of Tumut a garden all the year round, the vegetation never becoming the parched and withered spectacle so general throughout Australia in the heated season. Along the banks of the river, alluvial lands extend on both sides, with an average width of a little over three quarters of a mile. From the edges of these lands the ground rises gently into low ridges, which extend northerly and southerly to the future city site. On these ridges a large city can be built, with ample room for expansion in almost every direction.

The town as now constituted has four banks, four churches, curiously placed, as if they were the reflection of the pointer stars of the Southern Cross; a few schools, a lecture hall, and three inns. The principal buildings are of red brick, while the others are of the weatherboard, verandah fronted, corrugated iron roof variety. Pop. (1904) 1,400.

TUN, n. *tŭn* [F. *tonne;* Icel. and OHG. *tunna,* a cask: the same word as TON, which see]: a large cask; a measure consisting of 4 hhd. or 2 pipes; an old measure of capacity equal to 252 gallons (of 231 cubic inches); in old ale and beer measure the tun was equal to 216 gallons (of 282 cubic inches); a tun of whale-oil = 252 gallons, and is said to weigh 17 cwt. and about 30 lbs.: V. to put into large casks. TUN'NING, imp. TUNNED, pp. *tŭnd.* TUN-BELLIED, a. having a large belly swelling out like the middle of a cask. TO TUN UP, to put liquor into a tun.

TUN. See TON.

TU'ÑA, a fish. See TUNNY.

TUNA, a cactus. See PRICKLY PEAR.

TUNBRIDGE, *tŭn'brĭj:* market-town of England, county of Kent; on the Medway, 27 m. s.e. of London. The castle, on the Medway, near the entrance to the town, dates from the close of the 13th century, has a gate-tower of great size, richly ornamented, and is at present occupied as a military training school. The parish church is a large and old but sadly disfigured building.

The chief establishment in the town is the grammar school; to it are attached 16 exhibitions of £100 a year, tenable at either Oxford or Cambridge University, besides 12 lesser exhibitions. The manufacture of toys and turned and inlaid articles of wood (see TUNBRIDGE-WARE) is a specialty. Pop. (1901) 12,736.

TUN'BRIDGE-WARE: articles of wood, such as work-boxes, ring-boxes, desks, etc., covered with a veneer cut from a solid mass of small pieces of wood, of square and triangular shape, built up in geometric patterns, and carefully glued together; extensively manufactured at Tunbridge and Tunbridge Wells. This trade was formerly much greater than at present.

TUN'BRIDGE WELLS: famous English inland watering-place, the oldest but one in the country (Bath—q.v. —being the oldest); chiefly in Kent, partly in Sussex; 46 m. by rail s.e. of London, 5 m. s. of Tunbridge. The town, which is rapidly extending, occupies the head and slopes of one of the valleys of the Weald, and has in general a s.w. aspect, commanding very fine views. The three centres of population are Mounts Ephraim, Sion, and Pleasant, separated by a large common and cricket-ground. The town is charmingly irregular in plan; and much of it is laid out in districts called 'parks' with villas and mansions. The Wells, discovered 1606 by Lord North, are at the end of a promenade called the *Pantiles*. The waters are chalybeate. In the vicinity are charming rides and walks. The 'season' is June—September. Tunbridge Wells, a favorite resort for Londoners since the time of Queen Anne, reached its height as a fashionable resort toward the end of the 18th century; and still attracts throngs of visitors, though not so specially a resort of London society (see Thackeray's *Virginians*). Pop. (1901) 33,388.

TUNDING, n. *tŭn'dĭng* [L. *tundo*, I beat]: in the *slang of Winchester School*, England, a beating with sticks given by a monitor to a school-fellow for a breach of discipline.

TUN-DISH, n. *tŭn'dĭsh:* OE. for a *funnel*.

TUNDRAS, n. *tŭn'drăs* [Fin. *tuntur*, mossy flat]: swampy tracts of land, covered partly with a thick felt of bog-moss, partly with a dry snow white covering of reindeer-moss and varieties of lichens; bordering the Arctic ocean in Siberia, and stretching w. from the Ural along the n. of Europe. It is only the reindeer that renders this frightful waste habitable for the wandering hordes of Samoyeds, who hunt the furred animals as well as the swans and wild geese which in summer flock hither in vast numbers. These polar steppes, however, can be trodden only in winter, when the whole region is one sheet of frozen soil and ice. In summer, when the surface thaws, the greater part of the region becomes an inaccessible morass, except a portion along the n. coast of Siberia,

which retains its snow covering throughout the year. See Seebohm, *Siberia in Europe* (1880); *Siberia in Asia* (1882); and German works by Schrenk and Von Wrangel.

TUNE, n. *tūn* [F. *ton*, tone, tune—from L. *tonus;* Gr. *tonos*, the sound or tone of an instrument; the same word as TONE]: a series of musical notes of a particular measure and of a given length; a melody; a short musical composition; the proper relation of notes and intervals to each other; the state or capacity of giving the due sounds; fit temper or humor; disposition; harmony; concert of parts; state as to order: V. to put into a proper state, as an instrument, for producing the proper musical sounds; to put into any proper state or order so as to produce the proper effect; to form one sound to another; to sing harmoniously. TU'NING, imp.: N. the operation of adjusting a musical instrument in order that its various musical sounds may be produced as correctly as possible. TUNED, pp. *tūnd.* TUNABLE, a. *tū'nă-bl*, that may be put in tune; in *OE.*, musical; melodious. TU'NABLY, ad. *-blĭ.* TU'NABLENESS, n. *-bl-nĕs*, state of being tunable. TUNEFUL, a. *tūn'fûl*, harmonious; melodious. TUNE'FULLY, ad. *-lĭ.* TUNE'LESS, a. *-lĕs*, unmusical; not harmonious. TUNER, n. *tū'nėr*, one whose occupation is to tune musical instruments. TUNING-FORK, a steel instrument having two flat prongs, which by their vibrations, when struck, or pressed together and then suddenly set free, produce a particular musical note, used for regulating the Pitch (q.v.) of instruments, and also of the human voice; tuning-forks are usually tuned in C, as in Great Britain, or in A, as in Germany. OUT OF TUNE, not in a proper state for use; not in a proper temper or disposition. TO THE TUNE OF, *familiarly*, to the amount of, as, 'he was fined *to the tune of* forty dollars.' TUNEFUL NINE, the nine Muses.

TUNG'STEN: (Wolfram) a metallic element found in the minerals scheelite, wolframite, hübnerite. The pure metal is obtained by the Goldschmitt process, that is, by the reduction of tungstic acid by aluminum filings; also by reduction of the oxide by heating with charcoal in an electric or regenerative gas furnace. It is malleable and hard enough to scratch glass. Not acted upon easily by mineral acids. Atomic weight, 183.6; symbol, W; specific gravity, 16.6. It forms a number of compounds, among which are the chlorides WCl_2, WCl_4, WCl_5, WCl_6, the oxide WO_3, and the acid $WO(OH)_4$. Tungsten is used extensively alloyed with other metals, as iron and aluminum, to which it imparts very desirable properties. Tungsten steel is very hard and tough, highly magnetic, not easily rusted, and has the valuable properties of self-hardening. The alloy of tungsten and aluminum known as partinium is very light and tough and is used largely in automobile construction.

TUNGUS, *tŭn-gôs':* ethnographic group of the Turanian family, at present n. and e. of the Mongol group, inhabiting the vast plains stretching s. from the icy sea of Siberia, between the Yenesei and the Lena, the n. slopes and valleys of the Great Altaï, and the hilly uneven tract between the upper Amur and the Lena. The chief peoples included under this group are the Niujin, the Däurians, Tshapodshirs, Manchûs (in the s.e.), and Lamûts (on the e. coast). In the n. they have intermingled with the Samoyedes; in the w. with the Ostiaks, whose territory is on the other side of the Yenesei; and in the s. the Manchûs have been the rulers of China since 1643. Divided politically between Russia and China, the s. portion are Buddhists, while the tribes further n. mostly practice Shamanism (q.v.), a few having, by strenuous exertions of the Russian govt., been induced to profess Christianity. The Tungûs are partly nomad and wandering, partly agriculturists and settled rearers of cattle. The first of these are commonly classed according to the districts that they prefer to dwell in, as Tungûs of the forests, or Tungûs of the steppes: the former being shepherds, hunters, or fishers; the latter exclusively shepherds. The steppe Tungûs, again, are divided according to the animals of draught that they employ, into the reindeer Tungûs, the horse Tungûs, and the dog Tungûs. The Tungûs are in general robust and lively, with flat visage and small eyes, the latter characteristics, however, being much less prominent in them than in the Kalmucks. A portion of the Chinese Tungûs constitute the Ssolon nation, famed as warriors in Chinese modern history. The Tshapodshirs tattoo their faces.

TUNGUSIC, a. *tŭn-gô'zĭk:* of or pertaining to the Tungus, or the languages (Ural-Altaic) spoken by the Tungûs.

TUNHOOF, n. *tŭn'hóf* [see ALEHOOF, under ALE]: *alehoof* and *tunhoof*, old popular names of ground-ivy, the leaves of which were formerly employed to preserve ale before hops came into use.

TUNIC, n. *tū'nĭk* [L. *tunĭca*, an under-garment of the Romans worn by both sexes: It. *tunica:* F. *tunique*]: a long garment worn over the alb by an officiating clergyman in the Roman Catholic church; any loose frock or coat drawn in at the waist and reaching only a little way below it; a natural covering, as a seed-cover. TUNICATED, a. *tū'nĭ-kā-tĕd*, covered with a tunic or membrane; in *bot.*, covered by thin external scales, as the onion. TU'NICLE, n. *-nĭ-kl*, a little tunic; a natural covering; an eccles. garment, the same as the tunic or dalmatic. TU'NICA'TA, n. plu. *-kā'tă*, or TU'NICARIES, n. plu. *-kėr-ĭz*, a class of invertebrata, called also Ascidians, having the body inclosed not in a shell, but in a soft elastic tunic, perforated by two apertures and composed of a substance resembling Cellulose (q.v.). The tunicaries are extremely

numerous, and are found in all seas (see ASCIDIA; SALPA; ZOOLOGY). TU'NICIN, n. *-nĭ-sĭn*, the substance, allied to cellulose, of which the test of tunicata is composed.

TUNIS, *tū'nĭs:* French protectorate, formerly one of the Barbary States, in n. Africa, e. of Algiers; washed on its n. and e. coasts by the Mediterranean; touching the desert on the s., and Tripoli on the e.; greatest length n. to s. about 440 m.; average breadth 160 m.; about 45,000 sq.m. Pop. (1901) 1,900,000, mostly Bedouins, Arabs, and Kabyles.—The Atlas range traverses Tunis and terminates here. The n. coast is rocky and steep, with numerous bays, of which the largest is the Gulf of Tunis; and two of its promontories, Capes Blanco (*Râs-el-Abid*) and Bon, are the most northern in Africa. The e. coast is flat, sandy, and infertile, like that of Tripoli: it has two large gulfs, Hammamet and Cabes (*Syrtis Minor* of antiquity). The s. part of Tunis belongs to the desert steppe known as Belud-el-Jerid. There is only one fresh-water lake of much size, that of Biserta or Bensart, near the n. coast. No rivers are navigable. The longest is the Mejerdah (*Bagradas* of the ancients), the most important river in n. Africa, which flows generally n.e. about 300 m. into the Gulf of Tunis. Other streams are the Ved-el-Milinah and the Ved-el-Kebîr. There are several mineral springs in the country. The climate is fine, and the soil exceedingly fertile, so that, in spite of very poor agriculture, wheat, barley, maize, durra, pulse, olives, oranges, figs, grapes, pomegranates, almonds, and dates are abundantly produced. The culture of oil is extensive and very lucrative. Great herds of cattle are fed on the plains; the sheep are famous for their wool; and the horses and dromedaries are no less notable. The chief mineral products are sea-salt, saltpetre, lead ore, and quicksilver. In the vicinity of the sea-coasts, but chiefly in the cities of Tunis and Susa, there are some active industries. The leading imports were cotton and metal goods, sugar, coffee, and clothing; the exports, olive oil, cattle, wheat, barley, tan, sponges, and zinc ore. Tunis has in operation about 300 m. of railroad.

The predominant race is of Arabic descent, but there are many Berbers, especially in the interior. The territory corresponds nearly with that of ancient Carthage; and for a sketch of its pre-Christian history, see CARTHAGE; ROME; HANNIBAL; HAMILCAR; SCIPIO; JUGURTHA; etc. Its subsequent fortunes, till 1575, are interwoven with the general fortunes of Barbary (q.v.); but in that year Sinan Pasha conquered and incorporated it with the Ottoman empire, and gave it a new constitution. The govt. was placed in the hands of a Turkish pasha, a divan or council, composed of the officers of the Turkish garrison and the commander of the Janizaries. After a few years an insurrection of the

soldiery broke out, and a new government was established, whose head was a 'Dey,' with very limited authority; the chief power being exercised at first by the military divan. Gradually, however, an officer with the title of 'Bey,' whose original functions had been confined to the collection of tribute and taxes, acquired supremacy over the other authorities, and finally obtained a kind of sovereignty, which Murad Bey succeeded in making hereditary. The family of Murad Bey ruled in Tunis for 100 years, and gained undesirable renown by their conquests on the mainland and their piratical enterprises against Christian powers at sea. During the 18th century, Tunis became tributary to Algiers. About the beginning of the 19th century, Hamuda Pasha threw off the Algerian yoke, subdued the Turkish militia, and created a native Tunisian army; in consequence of which Tunis virtually attained independence. Subsequent rulers, Achmet Bey (1837), Mohammed Bey (1855), and Mohammed Sadyk Bey (1859), have been liberal, enlightened, and reforming. By a firman of 1871, the sultan renounced the tribute formerly exacted, and fixed the relations of the Sublime Porte to Tunis. With the proclaimed purpose of chastising the Kroumir tribes, who had made incursions into Algerian territory, France sent an expedition to Tunis in the spring of 1881; but the result was that under compulsion the bey signed a treaty (1882) giving France extensive power, and practically making Tunis a French dependency or protectorate. Tunis is still nominally under the authority of the bey; but a French minister resident really controls affairs. The Porte protested in vain; but persistent insurrections against French authority necessitated tedious and extensive military operations.

TU'NIS: city, cap. of the regency of Tunis; on a small lagoon, near the s.w. extremity of the Lake of Tunis, about 3 m. from the ruins of ancient Carthage. The streets are narrow, unpaved, and dirty; but the bazaars are well furnished, and many of the mosques are really splendid. All the mosques are closed against Christians. The ceilings of the bey's palace glitter with gold and carmine and azure: the court-yard is paved with marble and surrounded by arcades supported on marble columns. The citadel, begun by Charles V. and finished by Don John of Austria, is interesting from its collection of old arms, and was formerly the great slave-prison of Tunis. There are also Rom. Cath. and Greek churches, Jews' synagogues, an Italian theatre, and large barracks. Tunis is the commercial centre of the state, and, having been made directly accessible to ocean-going vessels by the cutting of a ship-canal (1893), more than 80 per cent. of the total imports pass through it. Tunis has many industries; among the chief are making of silks and woolens—e.g., shawls, tapestries, mantles, burnooses, and woolens, leather, soap, wax, and olive-oil.—Pop. 170,000.

TUNKERS, *tŭng'kĕrz*, often called DUNKARDS *dŭng'kĕrdz;* but terming themselves simply Brethren, or The Brethren: religious sect, occupying settlements in New England, N Y., Penn., Ohio, Ind., and other middle and s. states. They are nowhere numerous, and are chiefly agricultural people. They profess that their association is founded on the principle of brotherly love. The name T.—from the German, signifying Dippers, and due to their dipping in baptism—is commonly, by corruption, pronounced and written *Dunkards*. In the vicinity of their settlements, they are known frequently as the *Harmless People*. They derive their origin from a small village on the Eder in Germany, but have been an exclusively American sect since the beginning of the 18th c., when they all emigrated to America. They reject infant baptism, and have no ministers specially devoted to the ministry as a profession. Every brother is allowed to stand up in the congregation and exhort; and when one is found particularly apt to teach, he is ordained by laying on of hands with fasting and prayer, and is expected to devote himself in some measure to the ministry, though without any stipend or pecuniary reward, even if his own crops should suffer by his neglect of them. Deacons and deaconesses are appointed. Like the Quakers, they use great plainness of dress and language; they refuse to take oaths or to fight; and they will not go to law. They celebrate the Lord's Supper, and accompany it with love-feasts, washing of feet, the giving of the right hand of fellowship, and the kiss of charity—all which observances they regard as scriptural. They anoint the sick with oil in order to their recovery, depending on this unction and prayer, instead of on medicine. They generally believe in the doctrine of universal salvation; but it is not a tenet of the sect. They do not insist on celibacy as an absolute rule; but they commend it as a virtue, and discourage marriage. They are industrious and honest, and universally held in good repute among their neighbors.

In 1882–3 the sect was divided into three branches, popularly known as the Conservative, Progressive, and Old Order Brethren, by reason of differences concerning the enforcement of the principle of non-conformity to the world.—The largest branch 1890 was the Conservative, which was represented in 28 states and 2 territories, had 720 organizations, owned more than 850 church edifices, rented 180 halls, had church property valued at $1,121,541, 61,101 members, and was strongest in Penn., Ind., and O. This branch maintains Sunday schools, schools for higher education, and missionary enterprises. The Progressive branch was represented in 15 states, chiefly Penn., Ind., and O.; had 128 organizations, owned nearly 100 church edifices, rented 37 halls, had church property valued at $145,770, and 8,089 members. They style themselves Brethren, and object to the name T. or Dunkards. The Old Order Brethren were believed to number about 3,000 members, but for years they have declined giving information about themselves.

TUNNAGE, n. *tŭn'nāj:* same as TONNAGE (q.v.).

TUNNEL, n. *tŭn'nĕl* [F. *tonnelle*, a trellised walk, a tunnel for entrapping partridges—from *tonne*, a tun, an arbor (see TON and TUN): comp. Gael. *tunna*, a tun, a vat: W. *twrnel*, a tub, a vat]: vaulted underground passage, often through a hill or under a river—so named from its resemblance to the interior of a tun or cask; in *OE.*, shaft of a chimney; passage for the smoke; a funnel; a net wide at the mouth and ending in a point: V. to form or cut a tunnel through or under; to hollow out in length; in *OE.*, to catch in a tunnel-net. TUN'NELLING, imp.: N. the operation of cutting a passage through a hill or under a river, and arching the roof. TUN'NELLED, pp. *-nĕld:* ADJ. having a tunnel formed or made through; penetrated or cut through, wholly or partially, as a hill. TUN'NELLERS, n. plu. *-ĕrz*, on *shipboard*, men who fill casks with water. TUNNEL-KILN, a lime-kiln in which coal is burned. TUNNEL-NET, in *OE.*, a net wide at one end and narrow at the other.

TUN'NEL: passage constructed under ground to carry a road, railway, canal, stream of water, or the like. Tunnelling, long in use for roads and aqueducts, has of late received great development for railways. In tunnels of considerable length, as the progress made by working from the two ends would be very slow, it is considered advisable to begin the work from many points of its length; for this purpose, shafts or pits are made at these points down to the level of the T. Of these shafts, some are temporary, kept open only till the end of the work; others are permanent, and for ventilation of the tunnel when in use. These shafts have to be large enough to allow the ascending and descending skips or buckets containing the excavated materials to pass one another. For the temporary shafts, an elliptical shape is found to give the greatest room for this purpose at the least expense. Square shafts are avoided, on account of the difficulty of excavating the corners in rocky strata. As the shaft descends, its sides are lined with timber-planks, supported by strong timber-frames, about 5 ft. apart. The permanent shafts, when the material is not of rock sufficiently solid, are lined with brick-work or masonry, built in lengths, as the shaft proceeds downward. These permanent shafts are generally made circular in section; and it is found better to place them 9 to 12 ft. from the side of the T., communicating with it by a small passage: this is convenient in the construction, also forms a useful refuge for workmen during the passage of trains. These shafts are usually about 10 ft. diameter. They are sunk a few ft. below the floor of the T., to form a pit for the collection of the water from the workings, which is hauled to the top in barrels or buckets. The raising of the excavated material and the water, and the lowering of building materials and of the workmen, is done by a windlass, a horse-gin, or steam-power, according to the extent of the work. On the completion of the shaft, the T. is begun in both directions from its bottom; and in ordinary rock it is found convenient to begin by making a small adit, or passage, along from shaft

to shaft, through the whole length of the T.; this is made 6 or 7 ft. high, and the top of it placed at the level of the top of the tunnel. When this is completed, the correct centre line is marked out in it throughout the T.; the adit is then enlarged to the shape and size of the arch of the T., which is built in; and then the excavation is completed, and side-walls built up to underpin the arch. In cases where the material is soft and full of water, the full section of the T. is usually carried forward at once; and in such cases an invert has to be built between the side-walls, to withstand the upward pressure, as the pressure of soft material has the character of a fluid pressure, and presses the T. on all sides. The excavation is then done in lengths of about 24 ft., each firmly secured with poling-boards and timber bars, and securely shored; the centres are then set, and the brick-work built up. The timber bars are usually drawn out when the brick-work is carried up, and the holes that they leave are rammed tight with clay; but the bars have sometimes to be built in. When the quantity of water is very great, an adit is driven through the T., at the level of its floor, before the work is begun, to allow the water to run off.

Tunnels are generally made straight, but sometimes they are curved; this is done that they may pass under the lowest part of the hill, that the shafts may be as short as possible. They are frequently constructed on steep gradients; but as the trains experience some resistance from the air in passing through them, it is advisable not to make them so steep as the gradients in the open air.

The Mont Cenis T. (see CENIS, MONT) greatly surpassed any earlier enterprise of the kind. Its name is really a misnomer: the T. is a considerable distance from Mont Cenis, and the chief summit under which it passes is the 'Grand Vallon' (11,000 ft. high). This T. connects the railways of France and Italy, and is on the direct railway route from Paris to Turin. The length is 7 m. 4¾ furlongs. It is 434 ft. higher at Bardonnèche, on the Italian side, than at Modane, on the French side; therefore it is on a gradient of 1 in 45½ from Modane to the middle, and thence it falls 1 in 2,000 to Bardonnèche, this latter fall being sufficient to run off the water. The dimensions at Modane are 25 ft. 3½ inches wide at base, 26 ft. 2¾ inches at widest part, and 24 ft. 7 inches high—the arch being nearly semicircular. At Bardonnèche it is 11⅞ inches higher. It is all lined with stone-masonry, except at the Bardonnèche end, where the arch is brick. The work was begun 1857, and was at first done in the usual way, by hand; but 1861 the perforating machines described below were introduced on the Italian side, and two years later on the French side. 1863, June 30, the T. had been driven 5,400 ft., and the rate of advance was 9½ ft. per day. All efforts of the engineers to accelerate the work were for several years unavailing; and 1866, Oct., just one-half the distance, or 20,040 ft., had been pierced, showing the same constant rate of 9½ ft. per day. At this rate, the T. would not have been completed till 1872. By improved modes

of working, and with a favorable change in the nature of the rock, the rate became greater toward the end, and the two parties met 1870, Dec. 25. The T. was formally opened 1871, Sep. A premium was to be paid by the French govt. to the Italian govt., which did the work, for each year by which a term of 25 years, counting from 1862, was reduced. The French govt. were also to pay $6,262,542 for construction of one-half the tunnel when completed. This great work, which appeared almost impracticable to ordinary methods of tunnelling by manual labor, was rendered practicable by machinery introduced by the engineers, Sommeiller, Grandis, and Grattoni. The great difficulty lay in the fact that, from the great height of the mountain, shafts were impracticable, and progress could be made only from each end. The ventilation also presented serious difficulties. Sommeiller perfected a small machine, weighing 6 cwt., which bored a hole 1¼ inch diameter and 3 ft. deep in 20 minutes; the time taken by two miners working by the ordinary method being two hours: 11 of these machines were placed on a movable support, and were capable of working at almost any angle. Three or four large holes were bored in the centre of the heading, and round these other holes of the ordinary size, in all 80 holes. The large holes were not fired, but were for the purpose of weakening the rock. The others were then charged and fired in succession and in detachments, beginning with those nearest the centre, and working outward. The machines were worked by compressed air acting, like high-pressure steam, on a piston in a cylinder; this air being compressed outside the T. by water-power acting on the hydraulic-ram principle, also by an air-pump; it was used at a pressure of five atmospheres above the atmospheric pressure, and was conveyed to the workings by a pipe 7⅝ inches diameter. After it had expended itself in working the borers, it escaped into the T., and so ventilated the workings. The advanced heading was the only place where these machines were used. During the construction, a temporary locomotive railway was laid along the road over the pass.

The St. Gothard T., a still more stupendous enterprise, was begun 1871, Jan.; and 1880, Feb. 29, the borings from the Swiss and Italian sides met, though much time and labor were still requisite to prepare the T. for railway traffic. The total length is 9¼ m., width 21½ ft. The average rate of progress was 18 ft. per day; the improved M'Kean drill, latterly used, cut its way at the rate of 12 in. per minute. The contract of the T. was for $10,000,000; but the actual cost, including approaches, was greater. The Simplon T. (a double one) connecting the valleys of upper Rhone, Switzerland, and Diveria, Italy, is 12¼ m. long.

A T. connecting England and France beneath the Channel, for which a company was formed 1872, would eclipse all former undertakings; its length would be 31 m. But in 1883 the Brit. govt. declined to sanction the undertaking. The Arlberg T., begun in the middle of 1880, was completed 1885; it is 6¾ m. long, and gives direct railway

communication between the Austrian province of Vorarlberg, touching Lake Constance, and Innsbruck in the Tyrol. The Mersey railway T., between Birkenhead and Liverpool, 4½ m. from station to station, was finished 1886.

The most noted adits in the world are the ones at Schemnitz, Hungary, begun 1782, finished 1878, 10.27 m. long, built to carry off the waters from the mines; and the so-called Sutro T., in Virginia City, Nev., 20,000 ft. long, built to ventilate and drain the Comstock lode mines.

In the United States, the largest T. is that extending through the Hoosac Mountain in Mass., near the N. Y. and Vt. boundary-lines, controlled by the Fitchburg Railroad Company. It was projected 1825 for a canal, but the scheme was abandoned soon afterward on account of the introduction of the railroad system. In 1851 some experimental work was done; 1856 tunnelling was begun; 1862 the state assumed control of the work; and 1876 the work was sufficiently advanced to permit the passage of regular railroad trains on its two tracks. Owing to long suspensions, it was not completed until 1883. The T. is 4¾ m. long, and, with about 40 m. of adjoining railroad, it cost $15,000,000. Other notable railroad tunnels are those of the Delaware Lackawanna and Western and the Erie railroads through Bergen Hill, N. J., the longest 4,200 ft.; the Musconetcong T. of the Lehigh Valley road, 4,829 ft.; the Nesquehoning of the Lehigh Coal and Navigation Co.'s road, through Locust Mountain, 3,800 ft.; the Sand Patch of the Baltimore and Ohio road, through the Alleghenv Mountains, 4,800 ft.; the Greenbrier river, also in the Alleghenies, at the Big Bend, 6,400 ft.; and nearly 50 of less length. Subaqueous tunnels are usually constructed with the use of a shield, which method was first employed by Sir M. I. Brunel in 1823, in building a tunnel under the Thames at London. A new plan has recently been patented by D. D. McBean, and put into execution in making the subway double track tunnel at New York. A third method which has been proposed is by freezing, although this has not yet been employed in the actual construction of tunnels. One of the longest river tunnels is the one connecting Port Huron, Mich., and Sarnia, Canada, beneath the St. Clair River (q.v.). It is 6,050 ft. long, was built in 20 months, cost less than $3,000,000; was the first cast-iron segmental T. constructed. Other subaqueous tunnels are the one under the Severn in England, nearly 4½ m. long; two under the bed of Lake Michigan at Chicago, each 2 m. long, built to supply the city with pure water; the East Boston tunnel: and the nearly completed electric trolley tunnels under the North River and the North and East River tunnel of the Penn. railroad Co. at New York.

TUNNEL, St. Clair River Railway: see St. Clair River.

TUNNY, n. *tŭn'nĭ* [L. *thunnus* or *thynnus;* Gr. *thunnos,* the tunny-fish—from Gr. *thuncin,* to hurry or dart along: It. *tonno:* F. *thon*]: a fish of the genus *Thynnus* and family *Scomberidæ;* the Spanish Mackerel, but much larger than the mackerel, and highly esteemed as food along the Mediterranean, where it is particularly abundant. The tunny is a large fish, sometimes 9 ft. long, and weighing 1,000 lbs., or even more. Its form is much thicker than that of the mackerel; its tail so widely forked as to be crescent-shaped.—The Phœnicians established a tunny-fishery at a very early period on the coast of Spain, and the tunny appears on Phœnician medals of Cadiz and Carteia. Salted tunny was much esteemed by the Romans, and was called *Saltamentum Sardicum.* The tunny is captured generally by means of nets arranged in a funnel-like form, the fish entering the wide mouth of the funnel, and being gradually driven to the narrow end, where they are killed by lances and harpoons. The line of nets is often more than a quarter of a mile long, and costs about $6,000.—The AMERICAN TUNNY (*Thynnus secundo-dorsalis*) is commonly called the Horse-mackerel: it is found on the coasts of New York, and thence n. to Nova Scotia. It sometimes attains a length of 12 ft. It is nearly black above, silvery on the sides, and white below. Its flesh is much esteemed. It yields much oil, obtained by boiling the head and the belly: 20 gallons are often obtained from a single fish.

To the same genus with the tunny belong the Striped Bonito, and the Albacore or Albicore (*T. albacorus*), which inhabits the West Indian seas, and is esteemed for the table. The name Albicore, however, seems to be often given to different species of this family inhabiting tropical seas, and sometimes to the tunny itself. The Long-finned Tunny (*Orcynus alalonga*), about 12 lbs., off the coast of California, is there called Albicore.

TUNSTALL, *tŭn'stal:* market-town in Staffordshire, Eng.; 168 m. n.w. of London, on a branch of the London and Northwestern railway, and on the Trent and Mersey canal. Among its public buildings are the market, town-hall, and the old court-house, now used as a free public library and reading-room. There are veins of coal, iron, and clay in the vicinity, and it manufactures ironware, pottery, tiles, and brick.—Pop. 20,000.

TUP, n. *tŭp* [OF. *toup,* a ram—probably from butting with his head (see TOP): It. *toppa-toppa,* expressive of repeated blows]: a ram; a male of the sheep kind: V. to butt, as a ram; to copulate, as a male sheep. TUP'PING, imp. TUPPED, pp. *tŭpt.*

TUPAI'A. See BANXRING.

TUPELO: town, county-seat of Lee co., Miss.; on the Old Town Creek and on the Mobile and Ohio and the Kansas City, Memphis and Birmingham railroads; about 155 m., in direct line, n.w. of Jackson. It is in an agricultural and stock-raising region. The water supply is

obtained from about 40 artesian wells. The chief industrial establishments are cotton compresses, cotton-gins, flour mills, spoke factories, furniture factories, and machine shops. The two banks have a combined capital of $100,000. It has a high school and graded schools. Pop. 2,300.

TU'PELO: one of the several American trees of the genus *Nyssa,* order *Cornaceæ. Nyssa* is found also in Eastern Asia. They are swamp-loving trees, with alternate, entire, or nearly entire leaves, and regular, small, greenish flowers in capitate clusters, the fertile blossoms sometimes solitary, on slender axillary stalks, and appearing with the foliage. The drupe is more or less oval, with a compressed stone. *Nyssa sylvatica* is the sour gum, or pepperidge, growing farther north than the other species, and more apt to be found away from water, and made conspicuous in autumn by the scarlet of its foliage and by the dark-blue fruits, which are a valuable food for migrating robins. When leafless it is still noticeable, for the picturesque growth of its limbs, sometimes in round heads, often horizontal, as if the many knotty branches lay in strata. The bark is rough and gray. The wood is of a light color, but with a twisted grain, which makes it difficult to work. This unwillingness to split, however, makes it desirable for beetle-heads, ox-yokes, hubs of wheels, bowls, etc. Tupelo is durable when completely immersed in water, especially if salt, and is therefore of value for ships' keels; but it will not stand alternation of moisture and dryness. The southern mountaineers value it for 'chaw-sticks'—small pieces of the stem, chewed into brushes with which they may dip up snuff. In consequence of its erratic growth and fibre, sour-gum trees were debarred as evidence in boundary disputes, in cases where some time had elapsed after blazing trees, as shown by the condition of the scar. *Nyssa ogéche,* called the Ogeechee lime, from the stream of that name, which is said to be about its northern limit, is an inhabitant of southern river-swamps liable to inundations. Its young branches have a silvery gray back, and the short petioled oval leaves are whitish pubescent beneath, when young, and are about six inches long. It becomes a large tree of handsome but somewhat peculiar habit. The fruit is of the size and shape of an olive (which caused the French in Mississippi to call this tupelo 'the olive'), but is scarlet, and of an agreeable acid flavor. It is preserved in sugar. The wood is of little account, being soft, and the roots of one variety are so light that buoys for fishermen's nets were made out of them. *Nyssa aquatica* is the large tupelo, or 'cotton' gum, so called because tomentose in all its more youthful parts.

TUPPER, *tŭp'ĕr,* BENJAMIN; soldier: 1738, Aug.—1792, June; b. Stoughton, Mass. He served in the

French war 1756-63. At the beginning of the revolution he was major, and became colonel of a Massachusetts regiment 1776, and the same year commanded a flotilla of gunboats and galleys in the Hudson river, N. Y. He served at Saratoga under Gen. Horatio Gates, and was in the battle of Monmouth. He was brevetted general before the end of the war. Tupper was one of the originators of the Ohio Land Co. He settled in Marietta, O., 1787, and was judge 1788.

TUPPER, Sir CHARLES, K.C.M.G., M.D., D.C.L.: statesman; b. Amherst, Nova Scotia, 1821, July 2. He was educated at Acadia Coll. and at Edinburgh; won the diploma of the Edinburgh Royal Coll. of Surgeons 1843; entered political life in Nova Scotia 1855; was member of the executive council, and provisional sec. 1857-60; prime minister 1864-67. He was elected to the first parliament of the Dominion of Canada; became member of privy council 1870, and was pres. of that body till 1872, when he was made minister of inland revenue. He was minister of customs 1873-78, of public works 1878, of railways and canals 1879-84, of finance 1887; was appointed high commissioner of Canada in London 1884-88; member of the fisheries conference 1887; was created a baronet 1888. In 1896 he became premier of the Dominion but his administration was defeated on Manitoba school bill. In 1900 he failed of re-election to Parliament, and thus ended his political career.

TUPPER, Sir CHARLES HIBBERT: Canadian statesman, son of Sir Charles Tupper (q.v.): b. Amherst, Nova Scotia, 1855, Aug. 3. He was educated at McGill and Harvard universities, taking the degree of LL.B. at the latter in 1876. In 1878 he was admitted to the bar, and began the practice of law at Halifax, later practicing in British Columbia. He was elected to the Canadian House in 1882 and re-elected in 1883, 1887, 1891, and 1896. He entered the Conservative government as minister of marine and finance in 1888, holding that office till 1894. In 1895 he was minister of justice and attorney-general, and for a short time in 1896 solicitor general. As minister of marine, he obtained the passage of several acts providing for the safety of ships and seamen; as minister of justice he dealt ably with the Manitoba school question. In 1893 he represented Great Britain in the Bering Sea arbitration tribunal at Paris.

TUP'PER, MARTIN FARQUHAR, D.C.L., F.R.S.: English poet, popular rather than great: 1810, July 17—1889, Nov. 29; b. London; son of Martin Tupper, a well-known surgeon, descended from a family which had been expelled from Germany, 1548, on account of Prot. opinions, and had long been settled in Guernsey. Martin Tupper was educated at the Charter-house, and afterward at Christ-Church, Oxford. On leaving college he entered as a student at Lincoln's Inn, and was called to the bar

1835; but never practiced. In 1832 he published anonymously a small volume of poems, which attracted little attention. His *Proverbial Philosophy* appeared 1839, and was immensely popular both in Great Britain and in the United States, though ridiculed by the critics. Half a million copies were sold in the United States alone. A fair criticism would probably decide that, while there is nothing in Tupper's *Proverbial Philosophy* to justify its enormous success—so far as mere circulation goes—the book is yet something better than the mere conglomeration of stupid platitudes which its detractors so confidently declare it to be. Besides this work, on which his reputation rests, Tupper published *The Crock of Gold,* 1844, a tale; *Geraldine,* 1838, a ludicrous attempt to complete Coleridge's inimitable fragment *Christabel; Modern Pyramid,* 1839; *King Alfred's Poems in English Metre,* 1850; with other work in prose and verse. He died in London.

TURACIN, n. *tū'ră-sĭn:* a pigment containing copper, found in the feathers of some species of the *touraco* or plantain-eater.

TURANIAN, a. *tū-rā'nĭ-ăn* [in. Pers., *not Iranian,* i.e., not Persian]: term used by Sassanian monarchs to designate the parts of their realm lying outside Iran; then a designation for the family of languages now generally denominated the *Ural-Altaic.* Other terms have been suggested for this family—e.g., *Alatyan,* the Tartars of Siberia calling themselves *Alatys; Sporadic,* as said of scattered languages; or *Allophylian*—that is, spoken by other different tribes. As a philological term, *Turanian* may be taken as equivalent to *agglutinative* (see PHILOLOGY).—*Turanian languages* are classed by Max Müller in two great divisions, the Northern and the Southern. The N. division falls into five sections—the *Tungusic, Mongolic, Turkic, Finnic,* and *Samoyedic.* Of these, the Tungusic dialects, which extend n. and w. from China, are the lowest in organization, being nearly as destitute of grammatical forms as the Chinese. The Mongolic dialects are superior to the Tungusic, though the different parts of speech are hardly distinguished; both branches, however, show a tendency to grammatical development. The Turkic dialects, of which the Osmanli or Turkish of Constantinople is the most prominent, occupy an immense area, from the Lena and the Polar Sea to the Adriatic. They are rich in grammatical forms, especially in the conjugation of the verb. The most important members of the Finnic class are the Finnic of the Baltic coasts (see FINNS), and the Hungarian or Magyar (see HUNGARY). These have also a fully developed grammatical structure, and in point of declension are richer than the Turkic.

The S. division comprises, among others, the *Tamulic* or Dravidian dialects of s. India (see TAMIL); the *Gan-*

getic group, in two branches, the Trans-Himalayan (Tibetan, q.v.) and Sub-Himalayan (Bhotanese, etc.); the *Taic*, or the dialects of Siam; and the *Malaic*, or Malay and Polynesian dialects. Turanian languages do not present the unmistakable family likeness and the clear evidences of genealogical relationship presented by the Aryan and Semitic groups. The nature of their structure, and the nomadic character of the peoples speaking them, are sufficient to account for their diversity, even supposing them to have all sprung from the same stock. The only characteristic Turanian feature which always remains is this: the root is never obscured; the determining or modifying syllables are generally placed at the end, and the voweds do not become so absolutely fixed for each syllable as in Sanskrit and Hebrew. On the contrary, there is what is called the Law of Harmony, according to which the vowels of each word may be changed and modulated to harmonize with the key-note struck by its chief vowel. The vowels in Turkish, for instance, are divided into two classes, *sharp* and *flat*. If a verb contains a sharp vowel in its radical portion, the vowels of the terminations are all sharp; while the same terminations, if following a root with a flat vowel, modulate their own vowels into the flat key. Thus we have *sev-mek*, to love, but *bak-mak*, to regard, *mek* or *mak* being the termination of the infinitive. The term 'Turanian' is now usually restricted to the Northern division, but is being rapidly superseded by the more exact term 'Ural-Altaic.'

TURBAN, n. *tėr'băn* [F. *turban*—from Sp. and It. *turbante*, a turban—from Pers. *dulband*, a turban: the spellings *tolibant, turribant, turband,* occur in OE.]: the usual covering for the head worn by the people of eastern nations, consisting of a quilted cap round which a sash or scarf is twisted; a lady's head-dress; a hat consisting of a crown either without a brim, or with a brim turned up close along the crown; the whole set of whorls in a shell. TUR'BANED, pp. *-băn̈d*, wearing a turban.

TURBARY, n. *tėr'bă-rĭ* [mid. L. *turbārĭā*—from OHG. *zurba*, turf]: a place where peat or turf is dug; the right of digging peat or turf; a swampy peat-moss. TURBARY DEPOSITS, in *geol.*, swampy deposits.

TURBELLARIA, n. plu. *tėr'bĕl-lā'rĭ-ă* [L. *turbellæ*, a bustle, a stir—from *turba*, a crowd]: in *zool.*, an order of flattened worms; the whirl-worms.

TURBETH, n. *tėr'bĕth*. See TURPETH.

TURBID, a. *tėr'bĭd* [L. *turbĭdus*, confused, disordered; *turbārĕ*, to disturb—from *turba*, a crowd: Sp. *turbido*, muddy]: thick; muddy; not clear, as a liquid. TUR'BIDLY, ad. *-lĭ*. TUR'BIDNESS, n. *-nĕs*, or TURBID'ITY, n. *-ĭ-tĭ*, the state or quality of being turbid; muddiness.

TURBINATE, a. *tėr'bĭ-nāt*, or TUR'BINATED, a. *-nā-tĕd* [L. *turbĭnātus*, pointed like a cone, conical—from *turbo*

or *turbĭnem,* a whipping-top: F. *turbine*]: in *bot.,* shaped like a top, or a cone inverted; wreathed conically; spiral-shaped. TUR'BINA'TION, n. *-bĭ-nā'shŭn,* the act of spinning or whirling, as a top. TUR'BINE, n. *-bĭn,* a horizontal water-wheel (see WATER-POWER).

TUR'BINE: in mechanics, a word meaning literally that which spins or whirls around; a wheel which revolves by the aid of water, air or steam and thus furnishes motive power for machinery. Although the steam-turbine is as old as the Christian civilization it is only within the last half century that it has been fully developed. The ordinary turbine with which we are most familiar is the horizontal water wheel made to revolve by the escape of water through orifices, under the influence of pressure derived from a fall.

Water-Turbine Types.—There are three recognized types of the water-turbine, (1) the radial; (2) axial; (3) combined or mixed-flow. Turbine wheels are made in various sizes from 5 to 7 feet in diameter, with still larger sizes for extraordinary purposes. Perhaps the most powerful water-turbines in the world are those installed in 1894-5 for utilizing the power of Niagara Falls. The supply of water to the turbine is regulated by a gate or gates, which can partially or entirely close the orifice where the water enters or leaves. The speed of a turbine is regulated by opening and closing the gate which admits the water. Where the power used fluctuates, the speed will fluctuate unless some method is adopted to adapt the power developed to the power utilized. This is usually done by means of a governor, which is so devised that when little power is being used the resulting increase in speed will actuate it to close partly the gate, and when much power is being used the decrease in speed will actuate it to open the gate wider.

High and Low Pressure.—Turbines are divided into high and low pressure, the former being relatively small, revolving at a high speed, driven by elevated heads of water. The low pressure turbines are relatively larger, contain a larger volume, and run at a lower rate. In the Black Forest, Germany, turbines are running with heads of 72 and 354 feet, and having diameters of 20 and 13 inches respectively. Low pressure turbines perform excellent duty with large volumes of water having only 9 inches head.

The Radial Turbine.—In radial turbines the water in passing through the wheel flows in a direction at right angles to the axis of rotation, or approximately radially. The water may flow inward from the circumference to the centre, or outward from the centre toward the circumference. The best known type of the inward flow is the Francis turbine, and of the outward flow the Fourneyron turbine.

The Axial Turbine, or parallel flow as it is sometimes called, is one in which the water flows through in a direc-

tion generally parallel with the axis of rotation. The water may flow from the top downward or from the bottom upward. The best known type of the downward flow is the Jonval turbine.

The Combined Turbine, or mixed flow, is any combination of the radial or axial; that is, the water may flow inward and up or down or outward and up or down. Still another classification is made to distinguish reaction turbines from impulse turbines. In the reaction turbine all parts are filled with moving water, while in the impulse turbine the buckets or other parts are only partly occupied by the water passing over them, the atmosphere having access to the remaining space. A reaction turbine is driven by the dynamic pressure of the water, which may be under a certain static pressure, due to the fact that the inflow takes place under pressure, since the wheel is always filled with water. In the impulse turbine the inflow takes place freely against air pressure only. Most turbines are built on the reaction principle.

The Steam-Turbine.—The earliest known steam-turbine was that invented by Hero which is described in an Alexandrian manuscript of about 120 B.C. This was not a practical invention, however, being merely a toy. Little progress was made in the turbine up to the 17th century. Branca made an impulse steam-turbine in 1624, and Edward Somerset followed with a device in 1650. The French engineer Tournaire is entitled to particular mention as having in 1853 indicated the capabilities of the steam-turbine. But the general introduction of the steam-turbine since 1890 is due to the Swedish engineer, De Laval, and to C. A. Parsons. Thus it is acknowledged that the progress of the steam-turbine is wholly modern and mainly recent. Only after evolution of the modern mathematical sciences could its action be understood and the machine be properly designed; only after modern tools and methods of mechanical construction had become refined could it be built in safe and economical forms. The influence of the Hero toy or Alexandrian invention upon modern engineering is shown to have been of great value. The Hero idea lay dormant during nearly 2,000 years which elapsed between the days of Greek philosophy and modern, practically applied, science.

Modern Development.—Steam-turbines are heat engines, converting the calorific energy of the steam into directly-available mechanical energy. From another point of view they are analogous to hydraulic turbines, and in design, construction and operation, are controlled by the same ultimate principles. Today the turbine is more nearly a 'perfect steam-engine' than any other known type, so far as its design and construction are concerned. As in the case of hydraulic turbines the steam-turbine is divided into classes; the two principal ones being action and reaction turbines; and each of these classes is subdivided accordingly as the turbine is composed of a single

wheel or of several wheels, traversed successively by the steam in course of expansion. Among reaction turbines (compared in hydraulics to the Jonval turbine) of which, as multiple machines, the prototype is the Parsons turbine, the steam is only partially expanded in the distribution, and acquires its full expansion in the movable wheel. The steam therefore acts on the blades at once by its pressure and its velocity. In the action turbine, the steam only acts on the movable wheels by its velocity. Each wheel revolves in a casing in which the pressure is uniform. Action turbines revolve at a less velocity than reaction turbines. There are now recognized three ways of utilizing steam for the transformation of heat into useful work: (1) By directing a jet of steam on to movable objects, such as the blades of fans, or, in reaction wheels, by allowing the steam passage itself to revolve; (2) by condensing steam in a cylinder, and allowing the external atmospheric pressure to force a piston inward; (3) by cutting off slices of high-pressure steam, and expanding in the cylinders of the modern reciprocating engine. The present-day steam-turbine designer, however, is merely concerned with the first and oldest method.

The Impulse Steam-Turbine.—The simplest possible steam impulse turbine must consist essentially of a fixed nozzle guiding a jet of steam on to vanes arranged at a periphery of a rotating wheel in a very similar way to the buckets of the water-wheel; but to turn this wheel efficiently it is necessary not only to make the nozzle of suitable dimensions and shape for the work to be done, but to form the vanes or buckets of the wheel so that they make the best possible use of the steam as delivered from the nozzle. The function of the nozzle is to convert the whole available energy of the steam into mass velocity in the required direction. It should, therefore, be designed so as to expand the steam to the same pressure as that of the wheel chamber before the delivery on the vanes. If the nozzle is improperly formed, either the expansion will not be complete and the jet will burst into a cloud at the orifice, or eddy currents will be set up within the nozzle itself, and retardation of flow will be the result. The best shape for wheel vane faces is undoubtedly as nearly a semi-circle as is permitted by the angle of the nozzle. This angle is usually about 20°, which is nearly the maximum possible. While being of sufficient area to reverse the direction of current without shock or eddy, these vanes should be short, so as to minimize skin friction, and the edges should be sharp to avoid blanketing the nozzle. The most efficient mean speed of vanes is just under half the velocity of the steam current, thus leaving the exhausted molecules relatively motionless. For this reason single disk turbines must revolve at enormous speed and be geared down for driving ordinary machinery. For example, a

10-inch De Laval turbine working at 70 pounds' pressure revolves 14,000 times per minute.

The Multiple-Step Plan.—Geared motors are avoided by most engineers, and so the multiple-step steam-turbine was devised as a means for reducing the speed of rotation, and driving machinery direct. This idea was first developed by C. A. Parsons during 1884-7. The earliest Parsons parallel flow turbine was a collection of zigzag nozzles whose walls were formed by projecting rings of blades intermeshing, and so arranged that the 'zigs' were fixed to the inner circumference of a stationary hollow cylinder and the 'zags' to the outer circumference of a rotable cylinder. The modern Parsons turbines from which such notably economical steaming results have been obtained differ from the earliest—apart from improvements in mechanical and constructional detail—only in the alteration of the contour of the steam passages or nozzles from a zigzag to a sinuous shape. Instead of turning sharp corners the steam now traverses flowing curves, and the cross sectional area of steam channels increases in nearly exact proportion to the growing volume of steam as it expands to the exhaust pressure, the collective areas at each stage fulfilling more closely the conditions for a perfect nozzle. But as expansion takes place both within fixed and moving blades, as the whole passage is one continuous nozzle, the clearances and workmanship must be of the finest to minimize leakage, which in the earlier machines caused serious trouble.

Prof. Curtis, of New York, has designed large steam-turbines which follow Parsons' very closely in theory, but are differently worked out mechanically. Few revolving disks of comparatively large diameter are arranged, and the fixed steam nozzles only play upon part of their periphery, in some cases only two nozzles being employed on the first disk. Provision is made for altering the nozzle areas according to load by opening or closing their tapered walls, thus to a certain extent permitting correct maintenance of expansion ratios for varying steam-pressures and loads. Prof. Curtis argues that his arrangement of a few large nozzles and wheels in series lessens the percentage of waste through spilling of steam. In order to reduce the revolutions per minute as far as possible, Mr. Parsons appears to advocate a large number of turbines in series of small diameter, while Prof. Curtis believes in few wheels of large diameter. Prof. A. Rateau, of Paris, has worked out a multiple step impulse steam-turbine, consisting of a number of Pelton or Laval wheels arranged in series on a shaft, each wheel revolving in a separate chamber. Distributing nozzles convey the steam to the wheel vanes, and the whole of the expansion is accomplished within the fixed nozzles. The steam leaves the chambers at almost the same pressure at which it enters, the wheel vanes merely receiving the impulse due to the velocity of the particles; there is

therefore in this case no tendency to leakage and no necessity for clearance.

The Dow Turbine.—The turbine invented by Dow is an inward-flow wheel with concentric sets of guides and vanes in series, and is said to have attained 35,000 revolutions per minute, working regularly at 25,000, consuming 45 pounds of steam per horse-power per hour. The Dow turbine, as built for work in connection with the Howell torpedo, gives an average of about 11 H. P. in coming up to speed in regular working, at 60 pounds steam-pressure, and weighs from 100 to 150 pounds, or not far from 13 pounds per horse-power. Its fly-wheel rim attains a speed of nearly 7 miles a minute at 10,000 revolutions per minute. The designer estimates its power at 150 pounds steam-pressure and the same speed at 40 H. P., or one horse-power to 3.75 pounds weight, and states that this may be still further reduced to the extraordinary minimum of 2½ pounds weight per horse-power, a figure within the estimated allowable maximum for use in aeronautic work. These engines have been successfully employed in driving electric machinery and in 'spinning' the 'fly' of the Howell torpedo. For alternating electric currents, this system possesses the peculiar advantage of permitting a 'dynamo' to be employed having but two poles. In the United States, the substitution of the Dow turbine for the systems previously in use for spinning torpedos, has brought down the weight and volume of machinery from the earlier minimum of 360 pounds and three cubic feet per machine to 55 pounds and one cubic foot.

Application of Turbines.—The application of steam-turbines to torpedo boats, destroyers, gunboats, and cruisers, is to be anticipated from their unique capacity for developing great power and high speed with light and compact machinery. The conditions in a fast passenger steamer are favorable to the economical application of steam-turbines, and in such steamers the smoothness of their running will be a strong recommendation. C. A. Parsons, who has made remarkable developments in the steam-turbine, claims many advantages for the marine turbine engine. Among these many advantages he gives the following: (1) increased speed; (2) increased economy of steam; (3) increased carrying power of vessel; (4) increased facilities for navigating shallow waters; (5) increased stability of vessel; (6) increased safety to machinery for war purposes; (7) reduced weight of machinery; (8) reduced space occupied by machinery; (9) reduced initial cost; (10) reduced cost of attendance on machinery; (11) diminished cost of upkeep of machinery; (12) largely reduced vibration; (13) reduced size and weight of screw propellers and shafting. It may be said, generally speaking, that the larger the scale on which the engines are made, the

simpler is the construction, the higher the steam efficiency, and the lower the speed of rotation.

The Turbinia Experiments.—In 1894 the steam-turbine had developed to such an extent that a syndicate was formed to apply the turbine to marine work, and a vessel, appropriately named the *Turbinia,* was built to develop high speed and to secure determinative measures of the value of steam-turbines in driving the screw-propeller. The first outcome of the experiment on the *Turbinia* was the discovery of a previously unsuspected cause of inefficiency at high speeds of rotation of the screw such as were adopted in this construction—'cavitation' by centrifugal action about the screw, which worked in a self-created cave in the midst of the water, throwing out the water faster than it could flow into the space by the action of gravity, even reinforced by the often still more active tendency to fill the vacuum thus caused. It was only when the speed of rotations of the screws had been reduced to 2,000 revolutions per minute, and after they were set in series of 3 on the same shaft, that the little boat made her famous run and attained a speed of 32¾ knots an hour, and later of 34½. The trials of the *Turbinia* were reported as follows: 'The mechanical friction of the turbines is particularly small, and the work spent on friction is not materially increased by increasing the range of expansion. This allows the steam to be profitably expanded much farther than would be useful or even practical in an engine of an ordinary kind. Apart from questions of friction the addition of weight and bulk to allow for this extended expansion would be enormous in the ordinary engine; in the turbine it is very moderate. Steam is expanded nearly 200-fold in the *Turbinia* and this is accomplished with engines which are much lighter than reciprocating engines of the same power, although in these the expansion would be much less complete. Rough weather was met with in some of the trials, but the *Turbinia* proved to be a good sea boat. The machinery worked with perfect smoothness, the screws did not race and the bearings remained perfectly cool throughout. From first to last during the whole of the trials, there was no hitch whatever or difficulty of any kind in the action of the turbine. Some 20 were made under various conditions as to speed, the range of speeds tested extending from 6¾ knots to 32¾ knots. Two successive runs on the measured mile in opposite directions in smooth water and at the slack of the tide gave the following data:

TRIAL OF TURBINIA.

Time on the mile, first trial, 109 4/5 seconds; second trial, 110 seconds.

Corresponding speed in knots, first trial, 32.79; second trial, 32.73.

Mean speed in knots, 32.76.

Revolutions per minute, of high pressure and intermediate shaft, 2,230.

Revolutions per minute of low pressure shaft, 2,000.

Steam pressure in boiler by gauge, 210 pounds per square inch.

Steam pressure on admission to high pressure turbine, 157 pounds per square inch.

Greatest pressure in stokehold by water gauge, 7¼ inch.

'The speed reached during this trial, 32.76 knots, in the mean was the highest recorded for any vessel. It is greatly in excess of the speed hitherto reached for a boat so small as the *Turbinia*. It is clear that the exceptional speed developed in the *Turbinia* has been achieved without sacrifice of economy, and that the substitution of turbines driving high-speed screws in place of reciprocating engines driving screws of much more moderate speed is not attended with increased consumption of steam so far as fast running is concerned.'

The Viper Destroyer.—The success of the *Turbinia* led to the construction in 1899, of a naval 'torpedo-boat destroyer,' *Viper*, and this craft, only 210 feet in length, of 375 tons displacement, developing 11,000 horse-power, on 15,000 square feet of heating, and 376 feet of grate surface, in water-tube boilers, with steam at 175 pounds by gauge; at 1,050 revolutions of the turbines, made over 37 knots, above 43 miles an hour. The contract speed was 35 knots. The turbines were two high and two low pressure, each driving a separate shaft carrying two propellers. The turbines were 35 and 50 inches in diameter. No vibration was produced by the engines, and the engine-room was so quiet that it was hardly possible to realize the presence of engines developing over 10,000 horse-power. Here, as in all craft of the sort, the extraordinary performance in power production, once all is understood, is that of the boilers; that of a horse-power for each 1½ square feet of heating surface, and from each square foot of grate about 30 net horse-power. This is probably the most extraordinary phenomenon in this or any other example of marine engineering. For warships of the destroyer class the absolute maximum of possible speed is the first thing to be desired, and the expenditure necessary to secure the extra speed is a matter of comparatively small importance.

The Turbine Passenger-Steamship.—In 1901 the turbine for passenger steamships was first adopted on the *King Edward VII.*, a passenger steamer of a type in common use on the Clyde. To insure that accurate data on which the performance of the turbine might be obtained, the *King Edward* was modeled as nearly as possible of the same size and same general design as the paddle steamer *Duchess of Hamilton*, one of the crack steamers running on the route for which the *King Edward* was designed. The latter is, however, of slightly greater draft and more displacement. The weight of the motors, condensers, steam pipes, auxiliaries connected with the propelling machinery, shafting, propellers, etc., is 66 tons; which works out at about half the weight per indicated horse-power of the engines required for paddle

steamers of the same type. Another advantage secured to the boat by the adoption of the turbine engines is increased deck space for passengers.

Steam is raised in a double-ended Scotch boiler of the ordinary type, 20 feet long by 16 feet 6 inches in diameter. There are four furnaces at each end, made to work under forced draft with closed stokehold. For purposes of comparison, the capacity of the boiler under these conditions might be set down roughly at about 3,000 indicated horse-power. It is, however, in the steam-turbine—the first engine to realize the dream of a perfect steam-driven rotary engine—that the chief interest in the craft is centered. The principle of the turbine is fortunately simple enough to make it easy of explanation. Inside the cylinder to which the steam from the boiler is led is a drum or hollow shaft studded with row upon row of blades or vanes, all set at an angle to the flow of the steam as the sails of a windmill are set to the breeze. It is apparent that the rush of steam, deflected from its course, by the first row of blades, would not reach the next in such a direction as would allow it to do its work effectively. To meet this difficulty there are, between each row of the working blades, a row of guide-blades fixed to the inside of the cylinder casing and set at the reverse angle. These blades are stationary, and their sole purpose is to again alter the direction of the flow of the steam and bring it back to the straight course from end to end of the cylinder before it meets the next succeeding row of working blades. The tops of the revolving blades reach nearly to the outer casing of the cylinder, and the stationary blades project inward until they almost scrape the revolving shaft or drum. A series of turbine wheels on one shaft are thus constituted, each one complete in itself, like a parallel-flow water-turbine; but, unlike a water-turbine, the steam, after performing its work in each turbine, passes on to the next, preserving its longitudinal velocity without shock, gradually falling in pressure on passing through each row of blades, and gradually expanding. There is no rubbing friction and no wearing parts except the bearings on which the main shaft or drum revolves.

Following are the net results of the comparative trials:

	Duchess of Hamilton.	*King Edward.*
Coal	1,758 tons, 13 cwt.	1,429 tons, 16 cwt.
Mileage	15,604	12,116
Miles per ton	8.87	8.47
Number of days run.	111	79
Daily average consumption	15 tons, 17 cwt.	18 tons, 2 cwt.
Average speed	16½ knots.	18½ knots.

The success of the *King Edward* was so pronounced that arrangements were at once made for the construction of several large ocean liners equipped with turbine engines. The most famous of these leviathans probably are the *Lusitania* and the *Mauretania* of the Cunard Line,

each of 45,000 tons displacement, and 70,000 indicated horse-power, and each being 790 feet long, 80 feet wide and 60.6 feet deep. They were constructed in 1906 and each upon its first voyages began to establish records for transatlantic travel, the *Lusitania* in 1908. August, establishing a record of 4 days and 15 hours for the short route from Queenstown to New York, and 1907, November, of 4 days, 22 hours and 50 minutes for the voyage from New York to Queenstown. The *Mauretania* in the latter part of 1908 and early in 1909 established several new records for day's runs and also made the quickest voyage over the long course.

TURBINIDÆ, *tėr-bĭn'ĭ-dē:* family of gasteropodous mollusks, having a spiral shell, with a narrow entire aperture. The species are numerous and widely distributed. Some are large, others small; some are very beautiful. The beautiful pheasant-shells (*Phasianella*) of the South Seas are referred to this family.

TURBITH, n. *tėr'bĭth:* another spelling of TURPETH.

TURBO-ALTERNATOR: a machine consisting of an alternating-current generator mounted upon the shaft of a steam turbine.

TURBOT, n. *tėr'bŏt* [F. *turbot;* Dut. *tarbot,* turbot: said to be connected with Dut. *bot,* a plaice: most probably from L. *turbo,* a whipping-top, from its shape: comp., however, W. *torbwt;* Gael. *turbaid;* Ir. *turbit,* a turbot]: a large and highly esteemed flat-fish of the genus *Rhombus* and family *Pleuronectidæ,* having the body rhomboidal; the dorsal fin commencing immediately above the upper lip, and extending almost to the tail-fin; the eyes generally on the left side. The Brill (q.v.) belongs to this genus as well as the turbot, and some other less important fishes. The turbot attains a large size, sometimes weighing 70-90 lbs. Its form is shorter, broader, and deeper than that of almost any other flat-fish. The upper surface is brown in color, and studded with hard roundish tubercles. Like the other flat-fishes, it generally keeps close to the bottom of the sea; and it is found chiefly on banks where there is considerable depth of water. Some of the banks in the German Ocean, e.g., the Dogger Bank, abound in turbot; it is found also in estuaries, but less abundantly. In former times it was caught chiefly by long lines; but the greater part of the supply for the London market is now obtained by beam-trawling (see TRAWLING). Few kinds of fish are more prized for the table.—The AMERICAN or SPOTTED TURBOT (*Bothus maculatus*) also is highly esteemed for the table: it is common on the coasts of New England and New York. It attains a weight of 20 lbs. The breadth is about one-half of the length. The upper surface is smooth, reddish gray, with large circular or oblong darker blotches and numerous white spots. The DIAMOND TURBOT of California is *Hyopsetta guttulata.*

TURBULENT, a. *tėr'bū-lĕnt* [F. *turbulent*—from L. *turbulen'tus*, restless, agitated—from *turbo*, I disturb: It. *turbolento*]: in violent commotion; restless; disturbed; tumultuous; producing commotion; riotous; disorderly; refractory; insubordinate. TUR'BULENTLY, ad. *-lĭ*. TUR'BULENCE, n. *-lĕns* [F.—L.], or TUR'BULENCY, n. *-lĕn-sĭ*, a disturbed state; disorder or tumult of the passions; a disposition to resist authority, as by a mob or crowd.—SYN. of 'turbulence': agitation; tumult; tumultuousness; insubordination; unruliness; rioting; disturbance; sedition.

TURCISM, n. *tėr'kĭzm* [see TURK]: the civilization or religion of the Turks.

TURCOMAN, n. *tėr'kō-măn*, TUR'COMANS, n. plu. *-mănz:* one of a nomadic and predatory Turkish people in central Asia; also spelled TURKOMAN.

TUR'DIDÆ. See MERULIDÆ.

TUREEN, n. *tū-rēn'* [F. *terrine*, an earthen pan—from F. *terre;* L. *terra*, earth]: an earthen or porcelain vessel for containing soup, etc., at table.

TURENNE, *tū-rĕn'*, F. *tü-rĕn'*, HENRI DE LA TOUR D'AUVERGNE, *dėh lâ tôr dō-vairñ'*, Vicomte DE: one of the most eminent of France's military heroes: 1611, Sep. 11—1675, July 27; b. at Sedan, dept. of Ardennes; second son of Henri, Duke of Bouillon, and of Elizabeth of Nassau, daughter of William I. of Nassau-Orange, the great assertor of the liberties of the Netherlands. Turenne was brought up in the Reformed faith. On the death of his father, 1623, he was sent to Holland, where, under his uncle, the celebrated Maurice (q.v.), he was iniatiated into the art of war. Returning to France 1630, he was favorably received by Richelieu, who gave him a commission. In 1637 he was attached to the army of Bernard of Weimar, then engaged in Lorraine; and by bringing about the capture of Landrecies, Maubeuge, and other places, including Brisach, the key of w. Germany, Turenne gained such repute, that on his return to Paris (1638), he had quite a triumphal reception. The victories of Route and Casale in the Italian campaign, 1639, added to his laurels; and in 1641 he was intrusted with the supreme command. The conquest of Roussillon from the Spaniards, 1642, was proof of his military genius, and he was rewarded 1643 with the baton of a marshal of France, and the chief command on the Rhine, where repeated reverses, a defective commissariat, and want of pay, had completely demoralized the army. Through a liberal expenditure of his own funds, and of loans obtained by him on his own security, the troops were speedily re-equipped, and their *morale* restored by a victory over the Bavarians at Rottweil (1644). In 1644 he took Philipsburg and Mainz, but the following year, May 5, he was completely routed at Marienthal, by Mercy. This disgrace was avenged by

Condé at Nordlingen, Aug. 3, where Mercy was slain; and Turenne gloriously concluded the war on the part of France by the reconquest of the Treves electorate, the conquest of Bavaria in conjunction with the Swedes, and by a successful campaign in Flanders. In the civil wars of the Fronde (q.v.), which immediately followed, Turenne joined the party of the *frondeurs,* of whom his elder brother was one of the principal leaders; but after being defeated at Rethel (1615, Dec. 15), he withdrew to Flanders. On Mazarin's return from his exile at Brühl, Turenne joined his party, while Condé deserted to the *frondeurs,* and the two greatest generals of the period were for the first time pitted against each other. Turenne was uniformly victorious, though his forces were inferior in number to those of Condé, who was ultimately forced to retire from France. Turenne afterward subdued the revolted cities, crossed the n. frontier, and conquered much of the Spanish Netherlands. On the outbreak of war between France and Holland 1667, Louis XIV. created Turenne marshal-general of France, and would have made him constable but for his Prot. opinions. At the king's suggestion, Bossuet composed his celebrated *Exposition de la Doctrine Chrétienne* expressly for Turenne's conversion, and this, backed by the king's repeated solicitations and remonstrances, and doubtless, as Voltaire suggests, by the more efficacious promptings of ambition, had the desired effect, 1668. Turenne's compaign in Holland, in which he was nominally under Louis's command, was most triumphant; and the Elector of Brandenburg, who had ventured to side with the Dutch, was pursued to Berlin (1672), and forced to beg for peace. The emperor next took up arms on behalf of Holland, and Turenne was transferred to the Upper Rhine. This, his last campaign, is disfigured by the unjustifiable devastation of the Palatinate, under orders from Louvois. After routing the Germans at Mülhausen and Turckheim, and forcing them across the Rhine, he was at last opposed to a worthy antagonist in Montecuculi (q.v.); but their famous passage of strategy was left unfinished, Turenne being killed by a cannon-ball while reconnoitering the ground at Salzbach. His grateful sovereign ordered him to be entombed at St. Denis with the kings of France. By the order of Napoleon, his remains were placed under the dome of the Invalides, at Paris, 1800, Sep. 23. Turenne left Memoirs of his campaigns.

TURF, n. *tėrf* [Icel. and Sw. *torf;* Dan. *törv;* Dut. *turf;* OHG. *zurba,* turf: W. *torp,* a lump]: the grassy surface of untilled land; a detached piece of the surface of a grassy park; sod; sward; the fibrous, black, earthy substance used as fuel; peat; race-ground—hence, horse-racing (see TURF LAWS: HORSE-RACING: HORSEMANSHIP: HORSE): V. to cover with turf or sod. TURF'ING, imp.: N. the operation of covering with turf. TURFED, pp. *tėrft.* TURFY, a. *tėrf'ĭ,* abounding with or resembling

turf; in *slang,* given to horse-racing; sporting. TURF'INESS, n. *-nĕs,* the state or quality of being covered with turf. TURFEN, a. *tėrf'n,* made of turf; covered with turf. TURF'ITE, n. *-īt,* in *slang,* a betting-man; a frequenter of race-courses.

TURFAN, *tör-fân':* important city in the east of E. Turkestan, on the s. slope of the Thian Shan Mts. It consists of about 6,000 houses.—Turfan is a name also of Eastern Turkestan itself.

TURF LAWS: the rules which govern the ancient pastime of horse-racing. In the United Kingdom these are: 1. As to racing. The stewards or persons intrusted with the management and possession of the land for the time have a right, which is seldom enforced, to turn off any person they please from the grounds. Many of the great races are not run within a year from the time the horses are entered. The owner of a horse entered can withdraw or 'scratch' him before the race is run. When the race is run, the successful party may sue for the amount of the stakes; and if the race is not run, or cannot be run, each subscriber may sue for recovery of his contribution. If the stakes are contributed for an illegal game, it is otherwise; and before the stakes have been paid away, any contributor may sue for and recover his deposit. The stewards decide all disputes about the fairness of a race, and their award is binding: if they cannot agree, then it will fall to be decided by a jury.—2. As to wagers. By the act 8 and 9 Vict. c. 109, s. 15, all wagers were declared void, except as regards subscriptions of money or plate to be awarded to the winner of a lawful game, sport, pastime, or exercise. If one makes a wager on a race, he may retract it any time before the event comes off, and require the money, if deposited, to be repaid; and no wager can be tried in any court of law or equity, so that the winner cannot compel payment. It is merely a debt of honor.

TURGAI, *toor-gī',* Russian Central Asia: a district lying s. of the government of Orenburg, and n. of the Aral Sea. Area 176,270 sq.m. It is traversed in the w. by the southern extremity of the Ural Mountains. The rest of the country is steppes inhabited by Kirghiz and their herds. Pop. 453,123.

TURGENEV, *toor-gān'yĕf,* TOURGENIEFF, or TURGENIEFF, IVAN SERGEYEVITCH: Russian novelist: b. Orel 1818, Oct. 25 (Nov. 9); d. Paris 1883, Sep. 3. He was educated at Moscow, St. Petersburg, and Berlin, and in 1841-3 held an appointment in the ministry of the interior. For some years he lived as a country gentleman, gaining thus an intimate knowledge of Russian peasant life. For a short time he was imprisoned, then was held under surveillance on his estate, for a *Letter on Gogol* (1852), displeasing to the authorities. Thereafter he lived chiefly at Baden-Baden and Paris. His first important publication was the *Tales of a Sportsman,* and this was

followed by a great number of short tales and dramas, contributed chiefly to Russian periodicals. His earliest novel, *Dmitri Rudin*, was published in 1855, and this was followed by *Helene* (1858); *A Nest of Nobles* (1858), translated by Ralston, under the name of *Liza; Fathers and Sons* (1861); *Smoke* (1865); *An Unfortunate* (1868); *Spring Floods* (1876); *Virgin Soil* (1877), besides a great number of short stories. With these works he established a European reputation as a literary artist of the first order, and aroused an interest in the social and political condition of Russia. He was the first in Russia to understand the peasantry, and by his artistic rendering of its types he served, though he never directly approached the question, as a powerful agent toward the emancipation of the serfs. It was he who extended the meaning of the word 'nihilist' to its present familiar application. Gradually he seemed to Young Russia to draw away from a liberalizing movement with whose extravagances and mistakes he was dissatisfied. He displays the melancholy and the psychological analysis so common to Russian writers. But the finish of his genre sketches; the structure and balance of his stories so alien to customary Russian craftsmanship; the breadth of his work—these were in the main peculiarly his own. They may be in part ascribed to his western training and approbation of occidental methods. He did not write easily, and the sum of his work is comparatively slight, but it has sufficed to rank him among the chief of modern artists in general literature. He visited England on several occasions, and received the D.C.L. from Oxford. The best translations are in German and French. That of *A Nest of Nobles*, by Ralston (mentioned above), and of *Virgin Soil*, by A. W. Dilke, are the English ones most worthy of mention.

TURGENT, a. *tėr'jĕnt* [L. *turgens* or *turgen'tem*, swelling; *turgērĕ*, to swell]: swelling: tumid; protuberant. TURGESCENT, a. *tėr-jĕs'sĕnt* [L. *turges'cens*, beginning to swell; *turges'cĕrĕ*, to begin to swell]: growing large; in a swelling state. TURGES'CENCE, n. *-sĕns*, or TURGES'CENCY, n. *-sĕn-sĭ*, act of swelling; inflation; bombast.

TURGID, a. *tėr'jĭd* [L. *turgĭdus*, swollen, distended—from *turgērĕ*, to swell: It. *turgido*]: swollen; tumid; distended beyond the natural size; puffed up: pompous; bombastic; inflated, as language. TUR'GIDLY, ad. *-lĭ*. TUR'GIDNESS, n. *-nĕs*, or TURGIDITY, n. *tėr-jĭd'ĭ-tĭ*, state of being swelled; tumidness; bombast.

TURGITE, *tėr'jīt:* a common iron ore much resembling limonite, with which it is usually associated. It is distinguished from it by its red streak, higher specific gravity, 4.14 to 4.68, and by its violent decrepitation when heated. It usually occurs in compact-fibrous, often botryoidal or stalactitic coatings on the surface of limonite. It then possesses a brilliant submetallic lustre on

the outer surface and a much duller, satiny lustre on the broken fibrous surfaces. Its color is black or dark brownish-red; hardness 5 to 6. Its most typical American locality is in Salisbury, Conn. It also occurs in an earthy form like red ochre.

TURGOT, *tür-go'*, ANNE ROBERT JACQUES, Baron DE L'AULNE: French statesman and economist: 1727, May 10—1781, Mar. 18; b. Paris; descended from one of the oldest families in Normandy. Turgot was intended for the priesthood, but preferred law. In 1751 he renounced his intention of entering the church, and in the end of the following year he was admitted a councillor of the Parliament. While fulfilling the duties of this position he also occupied himself with economical studies, and made himself well acquainted with the physiocratic system of Quesnay. In 1761 he was appointed intendant of Limoges, which post he occupied for 12 years, and was long remembered with gratitude for his wise, salutary, and benevolent reforms and regulations. On the accession of Louis XVI. in 1774 Turgot was first put at the head of the marine; but a few months later he became comptroller-general of France. He moderated the duties on articles of the first necessity without loss to the revenue; freed commerce from many fetters, and encouraged industry by enlarging the rights of individuals, and abolishing the exclusive privileges of companies and corporations. He also formed a project for commuting the feudal rights, for rendering salt an article of free merchandise, and for reforming the royal household. His reward for these useful and benevolent views was opposition and ridicule. He was, however, able to carry into effect some very important improvements; but as he endeavored to control the nobility, restrict the clergy, and restrain the license assumed by the officers of the crown, they all united against him. The result was his dismissal from office in 1776, from which period he lived a retired and studious life until his death.

TURIN, or TORINO, Italy: capital of the province of the same name, on the Po, 75 m. s.w. of Milan. Its position at the junction of several Alpine mountain routes lends it much military importance. It contains numerous fine squares of *Piazzas*, chief of which is the Piazza Emanuele, unsurpassed on the Continent; Piazza Carlo Emanuele II. or Carlina; and others, usually embellished by equestrian statutes or busts of distinguished men. The Nuovo Giardino Pubblico, along the river, botanical garden, Giardino della Citadella, Giardino Reale and zoological garden are interesting parks. The Renaissance cathedral (1492-8) has a marble façade, and contains the tombs of the Dukes of Savoy. Other churches are the Consolata, San Spirito, San Massimo, Gran Madre di Dio, a Moorish synagogue, and a Waldensian church. La Superga is a fine Basilica on an eminence overlooking the town. The chief palaces are: Palazzo Madama, Cari-

gnano,—with natural history collections—Palazzo di Città, or town hall—containing a library and monuments —Palazzo Reale, or royal palace, with a royal armory, Palazzo dei Torri, Palazzo dell Accademia delle Scienze, with a fine collection of antiquities and a picture gallery, etc. The museums and Accademia Albertina delle Belle Arti, the exchange, arsenal, University (1404), theatres, hospitals, and numerous schools are the other important edifices. Manufactures are important and consist of silks, jewelry, furniture, pianos, gloves, leather, paper, soap, tobacco, machinery, and velvet hats. Turin was the capital of the modern kingdom of Italy until 1865; it was the ancient capital of the Taurini, a native tribe, and was the seat of government under Charlemagne, until 1032. The French captured the town in 1640 and in 1800 annexed it. In 1815 it was restored to the House of Savoy. Pop. (1901) 335,639.

TURIO, n. *tū′rĭ-ō*, TURIONES, plu. *tū-rĭ-ō′nēz* [L. *turĭō*, the tendril or young branch of a tree]: in *bot.*, a young shoot covered with scales sent up from an underground stem, as in asparagus; the early stage of a sucker when invested by leaf-scales. TU′RIONIF′EROUS, a. *-nĭf′ėr-ŭs* [L. *fero*, I bear]: producing tendrils or young shoots.

TURK, n. *tėrk* [*Tu-kin*, an old Chinese name by which the Turkish tribes were designated]: a native of *Turkey;* in a more extended sense, a member of a race (not confined to the empire of Turkey) related to the Mongols, and including the Petchenegs, Usbegs, Turcomans, etc. (see TURKS): from old ideas connected with the Turks, a cruel tyrannical man. TURKISH, a. *tėrk′ĭsh*, pertaining to or resembling the Turks. TURK′ISHNESS, n. *-nĕs*, the character of the Turks; Turcism. TURK'S-CAP, a handsome species of lily, the *Lilĭum Martăgon*. TUR′KEY, n. *-kĭ*, the country of the Turks; a large domestic fowl, originally from N. Amer.—so called either from the supposition that it came from Turkey, or more likely from the bright-scarlet color of the fleshy excrescences on its head (see below): ADJ. of or from Turkey. TURKEY-LEATHER, also called Morocco-leather, is prepared from goat-skin. TURKEY-RED, a fine durable red produced from madder (see below). TURKEY-STONE, a familiar name for the *whetslate* or *honestone*, some of the finest varieties coming from Turkey, used for sharpening cutting-instruments and for polishing plate (see HONE). TURKEY-WHEAT, an old name for maize.

TURKESTAN, Central Asia: the general name given to the region lying between Mongolia, China, and Tibet on the e. and the Caspian Sea on the w. It is divided by the Mustagh range and a southwestern outrunner of the Tyan-Shan Mountains into East or Chinese Turkestan, and West or Russian Turkestan.

EAST TURKESTAN is bounded on the n. by Sungaria, on the e. by Mongolia and China, on the s. by Tibet and India, and on the w. by Russian Turkestan. Area 550,-

340 sq.m. It consists of a desert plateau basin skirted by the Tarim river, and encircled on all sides by mountains—on the n. by the Tyan-Shan, on the s. by the Kuen-Lun, and on the w. by the Pamir highlands. Agriculture is carried on only in the oases and in irrigated districts along the river, where cotton, tobacco and hemp are grown. The chief exports are silver, silks, felts, carpets, and cotton. East Turkestan belongs administratively to the Chinese province of Sin Kiang. Pop. 1,200,000.

RUSSIAN TURKESTAN in its widest sense includes the entire southwestern portion of Asiatic Russia. It consists of the vassal states of Khiva and Bokhara in the s., the general government of the Steppes in the n., and the general government of Turkestan, or Russian Turkestan proper. The latter reaches from the Chinese Empire to the Caspian Sea, and consists of the districts or provinces of Samarkand, Fergana (with Russian Pamir), Semiryechensk, Syr-Darya, and the Trans-Caspian region. Area 649,644 sq.m.; exclusive of Trans-Caspia, 409,414 sq.m. The extreme eastern and southeastern parts are mountainous, but the greater portion consists of vast arid steppes traversed by the rivers Amu and Syr Darya which flow into the Aral Sea. Only the irrigated portions along the rivers can be cultivated; they produce wheat and rice in great quantities, besides melons, grapes, fruits, and cotton. The nomadic inhabitants of the steppes are engaged in cattle raising. Wheat, raw cotton and cattle products are the principal exports, and trade has been greatly facilitated by the completion of the Trans-Caspian railroad. The capital of the general government is Tashkent, and the pop. 5,260,406; exclusive of Trans-Caspia, 4,888,183.

TURKEY, *tėr'kĭ:* gallinaceous bird of the genus *Meleagris* and family *Pavonidæ;* or, according to some ornithologists, of a distinct family, *Meleagridæ,* both, however, being included by others in *Phasianidæ.* The head is bare, the neck wattled, and the bill of the male surmounted with a conical fleshly caruncle, sometimes erected, sometimes elongated and pendulous. A curious tuft of long hair springs from the base of the neck of the male, and hangs down on the breast. The bill is rather short, strong, and curved; the tail is broad and rounded, capable of being erected and spread out, as the male delights to do when he struts about in pride, with wings rubbing on the ground, uttering his loud peculiar *gobble.* The COMMON TURKEY (*M. gallopavo,* a term which covers two races, *M. sylvestris,* the wild turkey of the United States, and *M. mexicana,* or Mexican wild turkey) is the largest of gallinaceous birds. It is now bred in nearly all civilized lands. It appears to have been introduced into Europe in the beginning of the 16th century, and in some places became naturalized. In a domesticated state, the turkey varies much in plu-

TURKEY IN EUROPE, SERVIA, ROUMANIA, BULGARIA, GREECE AND MONTENEGRO.
SCALE OF STATUTE MILES.
0 50 100 150 200
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20° Longitude East from Greenwich. 25° 30°
45°
40°
35°
25°
AUSTRIA HUNGARY
SERVIA
BOSNIA
BELGRADE
MONTE-NEGRO
CETIGNE
ROUMANIA
WALACHIA
BUKHAREST
MOLDAVIA
BUKOWINA
TRANSYLVANIAN ALPS
BULGARIA
EASTERN ROUMELIA
PHILIPPOPOLIS
SOFIA
BALKAN MOUNTAINS
TURKEY
CONSTANTINOPLE
SEA OF MARMORA
Dardanelles
Gallipoli
Killa Bosporus
RUSSIA
BLACK SEA
ÆGEAN SEA
TURKEY IN ASIA
GREECE
ATHENS
MOREA
IONIAN ISLES
IONIAN SEA
ADRIATIC SEA
MEDITERRANEAN SEA
Szigeth
Essegg
Brod
Serajevo
Svornik
Vallevo
Krushevatz
Nish
Novibazar
Leskovatz
Pristina
Prisrend
Uskub
Ragusa
Cattaro
Antivari
Scutari
Durazzo
Elbassan
Prilip
Monastir
Brindisi
Otranto
Avlona
Berat
Kastoria
Veria
Mt. Olympus
Saloniki
Seres
Doiran
Demir Hissar
Gumurjina
Demotika
Enos
Thasos
Samothraki
Imbros
Lemnos
Rodosto
Feredjik
Scutari
Brusa
Midia
Adrianople
Kirk Killisseh
Tirnova
Varna
C. Kaliakra
Misivri
Burghas
Mangalia
Kustendje
Mouths of the Danube
Tultcha
Hirsova
Galatz
Braïlov
Ibraïla
Reni
Ismail
Kishenev
Tiraspol
Odessa
Akerman
Bolgrad
Kagul
Leova
Hushi
Piatra
Roman
Bakau
Berlat
Jassy
Pruth River
Skuleni
Ananiev
Botuschany
Bistritz
Maros
Karlsburg
Kronstadt
Hokchany
Ploesci
Pitesti
Tirgochil
Rimnik
Slatina
Krajova
Widin
Karakal
Ghurgevo
Rustchuk
Nicopoli
Plevna
Sistova
Rasgrad
Shumla
Silistria
Danube River
Servia
Belgrade
Semendria
Pancsova
Semlin
Temes R.
Save R.
Drina R.
Bosna R.
Verbas R.
Theiss R.
Maritza R.
Kara Su
Varda R.
Vistritza R.
Ushitza
Morava R.
Pirot
Vratza
Lovtcha
Tirnova
Eski Saghra
Tundja R.
Tatar Bazardjik
Hasardjik
Istib
Melnik
Strymon R.
Gulf of Contessa
Gulf of Saloniki
Gulf of Volo
Gulf of Lepanto
Gulf of Arcadia
Gulf of Nauplia
Gulf of Marathonisi
Gulf of Corinth
Strait of Otranto
Corfu
Parga
Vanina
Prevesa
Arta
Volo
Larissa
Trikhala
Lepanto
Patras
Zante
Cephalonia
Santa Maura
Ithaca
Argostoli
Tripolitza
Sparta
Navarino
Coron
Gallo
C. Matapan
C. Malia
Cerigo
Kephalonia
Skopelos
Euboea
Skyro
Chalcis
Negropont
Mitylene
Kielidromi
Andros
Samos
Nicaria
Tinos
Mykonos
Paros
Serpho
Siphanto
Nios
Milo
Polykandro
Astropalia
Amorgus
Ios
Santorin
Anaphi
Rhodes
Smyrna
Soios
Mendere R.
Caicus R.
Hermus R.
Cyclades Islands
Sporades Islands
R., MC N. & CO., ENGR'S, CHI.

mage, but not in its wild state. The plumage of the wild turkey is also richer, and its power of wing greater; but the wings even of the wild bird are short, scarcely extending beyond the base of the tail. The darkest-colored of domesticated turkeys most nearly resemble the wild turkey in plumage. In its native woods it seems to attain larger size. Turkeys were formerly plentiful in the forests of the Atlantic states and as far n. as Lower Canada, but have mostly disappeared as cultivation has advanced, and have become rare even in the e. parts of the valley of the Mississippi, where they were formerly very numerous. The turkey is found as far s. as the Isthmus of Darien, but not w. of the Rocky Mountains. It inhabits the woods of the larger islands of the West Indies. In warm climates it is said to produce two or three broods a year; in colder countries it produces only one. The males associate in flocks of ten to one hundred, and seek their food during great part of the year apart from the females, which go about singly with their young, or associate in flocks, avoiding the old males, which are apt to attack and destroy the young. At the pairing-time, desperate combats take place among the males. Wild turkeys roost on trees. They feed on all kinds of grain, seeds, fruits, grass, insects, and even on young frogs and lizards. They make their nests on the ground, merely gathering together a few dry leaves, and often in a thicket. The eggs are usually 9 to 15 in number, sometimes 20.

Though the turkey has been domesticated more than 400 years, it still shows many of its wild traits, and is more difficult to manage than ordinary poultry (see POULTRY). The hen lays 12 to 18 eggs, which are hatched in about 28 days. The chicks do not need food for 24 hours, but should then be supplied with hard-boiled eggs chopped fine, and crumbs of stale bread moistened with milk. Food should be given in small quantities, but at frequent intervals. After two weeks the food may be changed to scalded corn-meal mixed with skimmed milk, and boiled potatoes. Sour milk, a little boiled meat which has been chopped fine, and green food, as grass or cabbage, will also be beneficial. Later, cracked corn, buckwheat, and other grains may be supplied. The birds are very tender at first, and must not be allowed to leave the pen before they are two weeks old, or to roam in wet grass for two or three months longer; but from this time a large range is desirable. They must be kept free from lice, and should be provided with sheltered roosting-places. Though they do not reach maturity till the third year, a large proportion of the turkeys sold in our city markets are less than 10 months old. During the whole period of growth they should be fed regularly, and in the last 6 or 8 weeks cooked meal, corn, milk, and other fattening foods should be liberally supplied. Our domestic stock is descended from the Mexican wild turkey (*M. mexicana*). There are a number of breeds.

which vary considerably in size, form, hardiness, color of plumage, tendency to roam, and value for production of flesh and eggs.

The only other known species of turkey is *Meleagris ocellata*, native of Central America. It is not quite so large as the common turkey, and has a smaller tail. The neck is less wattled, but the head has a number of fleshy tubercles. The plumage is beautiful, rivalling that of the peacock in metallic brilliancy—blue, green, bronze, red, and golden hues being intimately and finely mingled, and forming *eyes* on the tail, whence the specific name.

TUR'KEY, or the OTTOMAN EMPIRE (q.v.): domain including portions of Europe, Asia, and Africa; and consisting of Turkey Proper, which is under the direct rule of the sultan, and of several dependent and tributary states. Pop. about 41,000,000. The arrangements sanctioned by the Berlin Congress in 1878 have largely changed the size and organization of the empire. See OTTOMAN EMPIRE—*History*. This congress, which met primarily to revise the 'preliminary' treaty of San Stefano, concluded between Russia and Turkey at the close of the war of 1877-8, revolutionized the relation of the Porte to the subject Christian principalities and provinces, alienated large portions of hitherto Turkish territory, and inaugurated a new era in the history of the Ottoman empire. For the principal results of the congress's work, see the titles of the several states which they chiefly concern—ROUMANIA: SERVIA: MONTENEGRO: BULGARIA: etc.—These results are here summarized.

The vassal states Roumania and Servia, as well as Montenegro, were declared independent, and each obtained a change or extension of territory. Roumania, which had to yield up its portion of Bessarabia to Russia, received in compensation the Dobrudscha, cut off by a line from Silistria to Mangalia. Servia was considerably extended to the south. Montenegro received an important addition to its territory, chiefly on the Albanian side, including the port of Antivari (Dulcigno, with its district, was added 1880). What was formerly the Turkish vilayet of the Danube was, with the exception of the Dobrudscha, now Roumanian, made into the tributary but automatic principality of Bulgaria, its southern boundary being the Balgan range. A large territory s. of the Balkans was organized as the separate province of Eastern Roumelia, and, though remaining under the authority of the sultan, secured the right of having a Christian governor-general, and administrative autonomy. It was practically united with Bulgaria after the war with Servia, 1885. It was agreed that Herzegovina and Bosnia, excepting a small portion of the latter, should be occupied and administered by Austria-Hungary, and thus in large measure alienated from the Porte; Spizza and its sea-board, immediately n. of Antivari, was incorporated with Dalmatia; Greece was to receive additional territory—the

TURKEY IN ASIA, PERSIA AND AFGHANISTAN.
SCALE OF STATUTE MILES.
0 50 100 200 300 400 500
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R., MC N. & CO. ENGR'S CHI.
Longitude East 50° from Greenwich.
TURKEY
PERSIA
AFGHANISTAN
ARABIA
BALUCHISTAN
TURKESTAN
TRANS CAUCASIA
EGYPT
AFRICA
INDIA
BLACK SEA
MEDITERRANEAN SEA
ARABIAN SEA
PERSIAN GULF
GULF OF OMAN
GULF OF ADEN
CONSTANTINOPLE
TEHERAN
CABOOL
CAIRO
TROPIC OF CANCER

congress recommending that the rectified frontier should extend up the Salambria river from its mouth, cross the ridge dividing ancient Thessaly from Epirus, cut off the town of Janina so as to leave it to Greece, and descend the Kalamas river to the Ionian Sea. In Crete the reformed government, promised 1868, was to be immediately and scrupulously made operative.

War with Greece.—In 1896 a revolt in Crete broke out and in Feb. 1897, Greece sent troops to the island and proclaimed the union of Crete and Greece as the only solution of the troubles between Crete and Turkey. In the succeeding war, Greece was beaten in every engagement of a month's campaign (Apr. 17—May 19, 1897) and the Turks overran all Thessaly. An armistice was declared while the powers settled the matter, the upshot being that Greece lost a strip of Thessaly, and paid a small indemnity. See CRETE; GREECE.

Balkan Troubles.—The ambition of Ferdinand of Bulgaria would not allow him to rest quietly under the suzerainty of Turkey, and his success in establishing his position as 'Czar' of an absolutely independent realm, produced important changes in the relation of Turkey to the Balkans, and influenced in a marked manner the course of international politics. The negotiations between the two powers reached a point (1908) where Turkey demanded the equivalent of $24,000,000 and Bulgaria offered $16,400,000 as the price to be paid for Bulgarian independence, and Ferdinand, without waiting for a conclusion of the matter, asserted the independence of his court and assumed the title of Czar. In this condition of affairs Russia found her opportunity and to preserve the peace of Europe, proposed to Turkey to remit $24,000,000 of the $100,000,000 Turkey was to pay Russia under the terms of the treaty of Berlin, and collect from Bulgaria the $16,400,000 she was willing to pay. This arrangement seemed satisfactory to all parties, and its consummation goes a long way towards removing, or at least lessening the danger of the ever recurring Balkan troubles.

In Asia the changes decreed by the Berlin Congress were much less than in Europe; the port of Batum (henceforth to be essentially commercial), Kars, and Ardahan, with a portion of Armenia, were ceded to Russia, and Khotour, e. of Lake Van, to Persia—the Porte engaging to apply at once much-needed administrative reforms in Armenia and elsewhere. By the 'conditional convention' 1878 between Turkey and the United Kingdom, the British government undertook to defend the Porte's dominions in Asia, and received in return the right to occupy and administer Cyprus. The rectification of the Greek frontier was not arranged till 1881. After endless negotiations and procrastination, which for a while seemed almost certain to lead to war, the Porte agreed to cede, and Greece to accept, a considera-

ble portion of territory, though less than the Congress of Berlin had recommended. The new frontier gave to Greece all Thessaly s. of the water-shed forming the n. boundary of the valley of the Salambria (anc. *Peneus*), including the towns of Larissa and Trikhala; and in Epirus follows the line of the Arta river, leaving the town of Arta to Greece. The fortifications of Prevesa were to be destroyed by the Turks, and the Gulf of Arta made neutral.

TURKEY IN EUROPE, generally hilly and undulating, is traversed by a mountain system which has its origin in the Alps, enters Turkey at the n. w. corner, and runs nearly parallel to the coast, under the names of the Dinaric Alps and Mt. Pindus, as far as the Greek frontier. This range sends numerous offshoots e. and w.; the great e. offshoot being the Balkan range, with its numerous n. and s. branches. The rivers of Turkey are chiefly tributaries of the Danube—the Maritza, Strumo, Vardar; the Narenta, Drin, and Voyutza.

On the high lands, the cold is excessive in winter, owing to the n.e. winds, from the bleak and icy steppes of s. Russia; and the heat of summer is almost insupportable in the w. valleys. Violent climatic change is, on the whole, the rule in European Turkey; but districts sheltered from the cold winds, as the Albanian valleys, have comparatively equable temperature. The soil mostly is very fertile; but the positive discouragement of industry by the oppressive system of taxation long in force has greatly hindered agricultural progress, and the most primitive implements are in common use. The cultivated products include most of those usual in central and s. Europe—maize, rice, cotton, rye, barley, and millet. The mineral products are: iron in abundance, argentiferous lead ore, copper, sulphur, salt, alum, and a little gold, but no coal. The wild animals are the wild boar, bear, wolf, wild dog, civet, chamois, wild ox, and those others which are generally distributed in Europe. The lion formerly inhabited the Thessalian Mountains.

TURKEY IN ASIA.—This portion of the Turkish empire is more hilly than the other. The two almost parallel ranges Taurus and Anti-Taurus, the basis of its mountain system, cover almost the whole peninsula of Asia Minor or Anatolia with their ramifications and offshoots, forming the surface into elevated plateaux, deep valleys, and inclosed plains. From the Taurus chain, the Lebanon range proceeds s. parallel to the coast of Syria, and, diminishing in elevation in Palestine, terminates toward the Red Sea coast at Sinai. The Euphrates, Tigris, Orontes, and Kizil-Ermak are the chief rivers. On the whole, Turkey in Asia is ill supplied with water, and though the mountain slopes afford abundance of excellent pasture the plains, and many of the valleys, especially of the Euphrates, Tigris and Jordan, are reduced by the parching droughts of summer to the condition of

YILDEZ PALACE AND KIOSK, CONSTANTINOPLE.

sandy deserts. In ancient times these now desert districts were preserved in fertility by artificial irrigation; but during the six centuries of almost constant war which convulsed this once fair region, the canals were neglected, and have, ever since the rise of the Osmanli power, remained unserviceable. Nevertheless the fertile portions produce abundance of wheat, barley, rice, maize, tobacco, hemp, flax, and cotton; the cedar, cypress, and evergreen oak flourish on the mountain slopes; the sycamore and mulberry on the lower hills; and the olive, fig, citron, orange, pomegranate, and vine on the low lands. The mineral products are iron, copper, lead, alum, silver, rock-salt, coal (in Syria), and limestone. The fauna includes the lion (e. of the Euphrates), the hyena, lynx, panther, leopard, buffalo, wild boar, wild ass, bear, wolf, jackal, jerboa, and many others; and the camel and dromedary increase the ordinary list of domestic animals.

Possessions in Africa.—Tripoli is a vilayet of the Ottoman empire. Egypt, under its hereditary khedive, is still tributary to the Porte, though of late years the relations of the tributary state to its suzerain have been gradually becoming looser, and Brit. influence has for several years been dominant in its administration. Tunis, till 1881 under Turkish suzerainty, is practically a French protectorate. See TRIPOLI: EGYPT: TUNIS: also OTTOMAN EMPIRE.

Industry and Trade.—Owing to the tenure of land in Turkey agriculture is in a very backward state. The greater part of the land is 'crown land, the right to cultivate being granted on payment of certain fees, subject to a certain amount of state supervision and subject to revocation if left idle three years. A further system of levying tithes on all produce and a tax on exports from one province to another (cereals were exempted from this tax in 1893, and it is proposed ultimately to abolish it entirely) discourage the thrift and enterprise of the farmer, and as a natural result a large portion of the arable land is not cultivated, though of great natural fertility. The chief exports in order of importance are grapes, silk and cocoons, grain, cotton, mohair, opium, coffee, valonia, figs, wool, and olive oil. The principal ports are Constantinople, Trebizond, and Smyrna, the trade being chiefly with Great Britain, Austria, and France.

Government.—The government of Turkey was always an absolute monarchy, the decrees of the Sultan being subject only to such veto as might be imposed upon them by the chief of the *Ulemas*, whose authority was nominally very great, but was, in fact, limited by the momentary popularity of the incumbent, or the temper of the people. Popular discontent forced the Sultan to grant a constitution in 1876, which, after a nominal existence of two years, was abrogated in 1878, and the despotism of the Sultan and the palace and official clique

went on again for thirty years, until in 1908 the growing power of the Progressive, or 'Young Turk' party as it was called, made Abdul Hamid II. fear for his life as well as his throne, and as a desperate remedy he restored the constitution of 1876, and representative government became a reality. The first parliament approximated 260 members, of whom an overwhelming majority were Moslems, about 215 of the whole number. Although this was not a greater percentage than the Moslems bore to the whole population, it was felt to be out of all proportion in a representative assembly, and among the first proposals made to the new parliament were plans for minority or at least a more equal representation among the many peoples, creeds, and interests involved. Early in 1909 (Feb. 13) the first cabinet was defeated on a direct vote of lack of confidence, because of delay in settling the Bulgarian question, detailed below, and the Grand Vizier and his associates resigned, giving place to a cabinet appointed by the Sultan, but one that was practically forced upon him by the Progressives. The situation, however, gradually became worse and in April, 1909, an army under 'Young Turk' officers marched against Constantinople. The city and the Sultan's palace were taken after scarcely a show of resistance had been made, and later Abdul Hamid was deposed. In May his brother was proclaimed Sultan as Mehmed V.

The problems confronting the government are: the continuance of peace, finance and Arabia. Peace and finance are largely, if not almost exclusively, dependent on such adjustment of the empire's Balkan relations as seems likely to be made. The problem of Arabia (whose fanatical tribesmen are constantly in revolt) and its hinterland, with Ottoman relations with Persia, is more difficult of solution, and much will depend on the wisdom and diplomacy with which the Young Turks use their power. The much-discussed Bagdad Railway, the first section of which was opened for traffic in 1904, and upon which construction has since halted, would seem to be the secret of Germany's apparent opposition to the reform régime at Constantinople. When completed to Bussorah it will tap a country rich in agricultural and mineral possibilities, and will undoubtedly be extremely valuable to the Sultan for strategic and administrative purposes. Germany, England, and France had reached an agreement with the Turks whereby construction on this railroad would be resumed at an early date. Great Britain has always watched this project very carefully, since the line, when completed, would bring middle Europe, dominated by her commercial rival, Germany, into close communication with her Indian empire, which is always an uncertain quantity in Britain's foreign relations.

Government of Provinces, Etc.—The new régime has made no change in the details of internal rule, and, as

SALAMLEK AT THE WHITE MOSQUE.

The Ceremony of the Sultan going to Prayer on Friday of each week.

under the old dominion, the governors of the *vilayets,* or provinces, are styled *valis;* each vilayet is divided into *sanjaks,* or *livas,* ruled by inferior officers; each liva containing a number of *cazas,* or districts; and each caza a number of *nahiyehs.* The provincial governors have no longer the power of life and death; and their power of practicing extortion on those under their rule has been greatly diminished. The variable imposts are still farmed; though considerable restrictions are imposed to protect the people from oppression. The established religion is Mohammedanism, but all other creeds are recognized and tolerated. The Koran is the highest authority in religion, law, and government. In 1897 it was estimated that 92.23 per cent. of the whole population were Mohammedans; Christians 7.50 per cent; Jews .26 per cent.; others .01 per cent. The Christians belong to the Armenian, Greek, Roman Catholic, Maronite, and some Protestant churches. Other religious communities are the Druses and Ansaries in Syria. Education was long neglected; but a new system was introduced 1847; and schools for elementary instruction have since been established throughout Turkey, and middle schools for higher education, and colleges for the teaching of medicine, agriculture, naval and military science, etc. Many wealthy Turks, however, send their sons to France or Britain to be educated. The newspapers published in Turkey are not all printed in Turkish: several are in Greek, French, and other languages.

Revenue and Debt.—Years before the war of 1877, the Turkish exchequer was evidently on the brink of insolvency. In 1875 a decree reduced the interest payable on the debt to one-half the proper amount; and another decree 1876 announced that no further payments would be made till the internal affairs of the empire should allow. The enormous expenditure of the war, and the loss of valuable provinces, added to the disorganization of the finances. The first budget that admitted a deficit was that of 1874-5, where the revenue was given at $109,604,178, and the expenditure at $111,048,104. In 1875-6 the revenue was estimated at $92,856,870, and the expenditure at $112,476,321. In 1878-9 the revenue was guessed at $68,040,000, expenditure (with part of the war expenses) $243,000,000. In 1890 the Sultan ordered the preparation of a budget for 1890-1, none having been issued since 1879. The estimates for 1897-8 made before the war with Greece showed a small surplus. In 1903 the Turkish debt was $652,506,290, included in which was the Russian war debt of $122,565,000. The public revenue comes from the land and property tax, income tax, tax for exemption from military service, tax on sheep, etc., and from customs duties.

Army and Navy.—Every Moslem in Turkey is liable to 20 years' service in the army and non-Moslems are obliged to pay a tax exempting them from this service.

The nomad Arabs and Kurds are also liable to military service but they usually manage to evade this duty. The Bashi-Bazouk force which once figured prominently in the Turkish army, was disbanded by order of the Powers. In 1908 the fighting strength of the army was about 800,000.

The navy has almost disappeared, there being in 1902 only two first class warships. The time of service in the navy is 12 years, and the crews are raised partly by conscription and partly by voluntary enlistment. The nominal strength is about 40,000.

TURKEY: a river in northeastern Iowa. It flows s.e. and enters the Mississippi in the southeastern part of Clayton co. The Galena limestone is found in the Turkey river valley. The river is about 100 m. long.

TUR'KEY BUZ'ZARD. See VULTURE.

TURKEY-RED: most durable, and perhaps most beautiful color yet produced on cotton; dyed by a process supposed to have been practiced in India from immemorial time. It passed thence through other parts of Asia to the countries of the Levant, and was introduced into France about the middle of the 18th century; and into Britain (Glasgow) 1783, by a Rouen dyer named Papillon, in conjunction with George Macintosh. Papillon allowed his process to be made public 1803; and turkey-red dyeing has since been extensively carried on in Glasgow and vicinity, and in Lancashire.

There is a mode of dyeing cotton red with madder practiced by calico-printers—the cloth being previously bleached with chloride of lime—where the whole process occupies only a day or two. But in the case of turkey-red, also a madder-dye, the operations are long and tedious, and the bleaching with chloride of lime especially objectionable. The three most essential of the eight operations are the oiling, or rather the impregation with an oleaginous soap, the mordanting with alumina, and the dyeing with madder or alizarin; but it is found that, if any of the numerous dippings in the oily emulsions are left out, the color is inferior in proportion to the number of omissions. Besides being largely used in its plain state, turkey-red cloth is extensively employed for handkerchiefs with white patterns produced on them by discharging the color (see BANDANA); and articles of various kinds, with patterns in several colors, are produced by ordinary calico-printing machines, where, by proper arrangements, the different colors are obtained on parts where the red color is discharged by chloride of lime.

TURKISH BATH: a popular form of hot steam or hot air bath in which the bather after being subjected for some little time to a considerable temperature, is vigorously rubbed down, and is then conducted through a series of cooling chambers till he has regained his normal temperature.

TURKISH LANGUAGE AND LITERATURE: language and literature of one of the Turanian (q.v.) group of idioms—now usually designated as the Ural Altaic group; chiefly divided into Eastern and Western Turkish. The Eastern is represented mainly by the Uigur (Jagatai), an idiom but recently recognized not only as belonging to the Turkic stock, but as its most ancient representative. Its forms are fuller and more pure, albeit, to some extent, harder and rougher. Its alphabet is formed from the Zabian, out of which have sprung also the Mongol and Manchu. Besides this, the Kiptchak, spoken in Kasan and Astrakhan, forms a principal branch of the E. Turkish, for which, however, little has hitherto been done philologically.

Of immensely higher importance is the Western Turkish, or language of the Osmanlis, which, through the conquests of that race, has spread far and wide over the whole of western Asia, the Levant, and parts of Europe. The Osman or W. Turkish (emphatically Turkish) is more melodious and soft than the E. Turkish, and so much mixed with foreign elements, chiefly Arabic and Persian, that, were it not for its grammar, which is purely Tatarian, it could hardly be called an original language, but rather a conglomeration of the three respective idioms. Besides, it has received large increase of words from other Asiatic and European languages, e.g., the Chinese, Greek, and Italian. It is one of the most widely spoken idioms; not only w. Asia, but even e. Europe, uses this tongue to a great extent for commercial and political transactions. The characters in which it is now written are no longer the original Uigur letters, but the Arabic, whose 28 characters have been increased by the four additional Persian characters—produced by further diacritical points—and a new one of their own, amounting in all to 33, which are written from right to left, as in all but one of the Semitic languages. But this alphabet is not suited to a language composed, as Turkish is, of elements belonging to the three great families of speech, Semitic, Indo-European, and Turanic. Neither the vowels nor the consonants are adequately represented in all cases. Occasionally, however, it is written also in Armenian characters, which render its sounds much more faithfully. There is no definite article or gender. The plural is indicated by a final *lar* or *ler*, and the cases are formed by addition of *ung*, *eh*, *i*, *den*, and *le* for gen., dat., acc., abl., and instrumental respectively; which are, in plural, affixed to the *ler* or *lar*. The adjective has no flexion, but is placed unchanged after the noun. Diminutives are formed, somewhat as in Italian, by suffixes. The comparative and superlative are formed by circumlocution. The personal pronouns are without gender, and their declension is like that of the nouns. The possessive pronouns are made by suffixes. The Turkish verb is of a very complex nature. There are seven *genera* (Active, Passive, Negative, Impossible, Causal, Reciprocal, Reflexive), all formed by certain monosyllables affixed or prefixed. The root of the verb is the

second person singular imperative, to which the infinitive affix *mak* or *mek* is joined. The moods and tenses are formed chiefly by addition of the respective forms of the auxiliary verb *olmak*, to be. Apart from this, there are special particles to express the optative, conjunctive, etc. Conjunctions are either formed by gerundives or possessive forms, or borrowed from Persian and Arabic. Adverbs are formed by certain suffixes. The Turkish construction is most peculiar: the genitive always precedes the nominative, and the verb always stands at the end. All this gives the Turkish style a peculiarly artificial and inverted appearance, and often a sentence cannot be in the least comprehended until it is quite finished. Oriental flourishes and allegorical figures of speech, with which T. is very lavish, do not facilitate the study of the language.

The original literature of Turkey is found in the scanty remains of the Uigur period. That remote e. branch of the Turkish family had, after their emigration from their homes, s. of Lake Baikal, to the Tangnu Tagh, been foremost in the contests and migrations of central Asia, until they disappeared in the Mongol empire about 1200. They were acquainted with Chinese literature, and had adopted Buddhist doctrines to some extent, and their scanty literary relics bear traces of these influences. When the Turks, in the 11th c., began their conquest of the countries of Mohammedan Asia, they learned to appreciate the literature of Persia, then beginning to grow up in its full glory; and, ever since, Turkish literature and Turkish language have retained a strong Persian impression. Two branches of Turkish literature are usually distinguished—first, the E. or Jagataian, which flourished chiefly between Timur's and Baber's time (1400–1530). Mir Ali Shir, vizier of Sultan Hussein, is the most renowned poet of this period. He also collected the most ancient Jagatai poems. Sultan Baber, of this epoch, wrote important Memoirs of his life and time (transl. into Eng.). The other or Turkish literature, principally so called, is exceedingly rich, but hardly deserving the name of an original literature, inasmuch as it is a mere imitation of Persian and Arabic models. Of early writers, deserving special mention are Sheikhi, romantic poet and physician, and Soleyman Tchelebi. In the 16th c., the most flourishing period of Turkey, were Meshihi, the poet; Kemal Pasha Zadeh, historian and jurist. In history there are, besides annalists like Saad-ed-Din, historians like Mohammed Effendi. Of the same epoch is Lamii, who excelled in many branches of literature, besides being an accomplished translator of Persian poets. Fasli (d. 1563) and Baki, chief of Turkish poets (d. 1600), conclude this period, which is followed by another of great activity, but of inferior rank. To it belong Nebi, the poet; Nefi, the satirist; but above all, Hajji Khalfah (q.v.), eminent historian, geographer, and encyclopedist. Raghib Pasha stands out in the 18th c., with Said Rufet Effendi and a number of smaller writers. Recent literature is unimportant. The best-known Turk-

ish grammars are Davids's (Lond. 1836), Redhouse's (1846, best ed. by Wells), Kasem-Beg's (1847), and Wells's *Practical Grammar;* and Kieffer and Bianchi's, Redhouse's, and Zenker's are among the best dictionaries. For the literature, see Hammer-Purgstall, *Gesch. der Osmanischen Dichtkunst;* De Sugny, *La Muse Ottomane;* Redhouse, *The History of Turkish Poetry* (1879); and Gibb's translations of *Ottoman Poems* (1882).

TURKMANSHAI, *tôrk-mân-shī':* village of Azerbijan, 65 m. e.s.e. from Tabriz; the place where, 1828, Feb. 22, was concluded the treaty between Persia and Russia, by which the former resigned to the latter the provinces of Erivan and Nakchevan.

TURKOIS n. *tėr-koyz':* see TURQUOISE.

TURKS, *tėrks:* numerous, important, and widely-spread family of the human race, whose members are found on the banks of the Lena in Siberia, as well as on those of the Danube and the shores of the Adriatic in Europe. The T. belong to the second of Blumenbach's five great divisions of mankind—*Mongolians;* and to the first, or *Mongolidæ,* in Dr. Latham's threefold classification. In this latter classification, the T. form a branch of the Turanian stock of Altaic Mongolidæ. Their geographical distribution, according to Latham, is as follows: '1. As a continuous population: e. and w., from the neighborhood of the Lake Baikal, 110° e. long., to the e. boundaries of the Greek and Slavonic countries of Europe, about 21° e. long.; n. and s., from the n. frontiers of Tibet and Persia, about 34° n. lat., to the country n. of Tobolsk, about 59° n. lat. 2. As an isolated population: along the lower course of the Lena and the shores of the White Sea, chiefly within the Arctic circle. 3. As portions of a mixed population in China, Tibet, Mongolia, Persia, Armenia, the Caucasian countries, Syria, Egypt, Barbary, Greece, Albania, and the Slavonic portion of Turkey in Europe.' The names Tourkoi, Turkai, and Turcæ occur in some ancient authors as applied to a Scythian people in Asiatic Sarmatia, and it is very likely that the Scythians of antiquity were allied in blood with the numerous existing Turkish tribes, if not absolutely their ancestors. The original seat of the T. was probably on the n. slopes of the Altai range, from which, while a portion emigrated into Independent Turkestan, others, going s.s.e., established themselves on the confines of the Chinese empire. Abel-Rémusat, Klaproth, Ritter, and other high authorities concur in tracing all now existing Turkish tribes to the Hiong-nu, a powerful nation who, prior to the Christian era, threatened to overrun and subjugate China, and who then occupied the whole vast region now called Mongolia, from n. China to Mt. Altai. Dr. Prichard coincides in this opinion. The Hiong-nu (or *Vile Slaves,* so called by the Chinese), indeed, for some time succeeded in establishing a kind of rule in China and even intermarried with the imperial family; but about the beginning of the Christian era, their power in China began to wane, and before the end of the 2d c. they were driven

back as far as Independent Turkestan. 'After the fall of the empire of Hiong-nu,' says Prichard, the T. 'are known in Chinese history by the name of Thu-k'iú, or Turks, and Whey-ou-eul, by Europeans written Huy-hurs, and, more correctly, Uigours. The Uigours, or Eastern Turks, whose history has been elucidated by Abel-Rémusat, are the link of connection between these more remote nations and the Seljuki and Osmanli Turks, who are known to European historians.'

After the fall of the Hiong-nu empire the tribes who composed its strength separated, some maintaining themselves in their acquired settlements, and even conquering portions of China; but by far the greater number spread w. over w. Mongolia, E. and W. Turkestan, and s. Siberia, and gradually lost their power and unity as a nation. Out of this *débris* of a fallen people arose, in the 5th c., the great empire (the empire of Kiptchak) of the Thu-k'iú, which contested the supremacy of central Asia with the Chinese on the e. and the Sassanidæ (q.v.) on the w., ultimately falling (744) before the Hoei-he, a confederation of Turkish tribes previously subject to it. The Hoei-he, attacked in the w. by the Hakas (ancestors of the present Kirghis), yielded to their assailants 848, but retained their power e. of the Bolor-tagh, and for 150 years longer ruled supreme from that range to the Hoang-ho. During the eight centuries succeeding their expulsion from China, a regular though slow progress westward had been maintained by some of the Turkish tribes, a portion of whom appear (5th c.) in s. Russia and on the n. frontier of the Byzantine empire, driving before them the kindred race of the Avars. They were found in Syria and Mesopotamia in the 7th c., and about the same time wandered into n. and e. Khorassan. But the seat of power of the Turkish race still was in central Asia, whence in the 10th c. the Seljuks (q.v.) emerged, conquering Persia, Syria, and Asia Minor, and establishing an empire which reached from Constantinople to the borders of Mongolia. The subdivision of the Seljuk empire in s.w. Asia led to its gradual absorption by the Khaurezmians in the n. and the Kurds in the w., till the irresistible tide of Mongol invasion under Genghis Khan (q.v.), rolling over central and w. Asia and e. Europe, completely overwhelmed Turkish dominancy. The great empire of Timur (q.v.) was Turk, with a strong infusion of the Mongol element, the residue of Genghis's irruption: and its destroyers, the Usbegs (q.v.), and the various other tribes—Kirghis, Kiptchaks, Turcomans, etc.—which now possess its extensive domains, also are of Turkish race. The Osmanli-Turks are descended from a portion of the Turkish tribe of the Kayi, which fled from its settlements in Khorassan before the Mongols, and took refuge with the Seljuks of Iconium. See OTTOMAN EMPIRE: SELJUKS: ETC.

The following is the enumeration of the principal Turkish tribes by Latham: '1. *Uigurs.*—On the Mongol frontier: belonging to China: the Uigurs were the first Turks that used an alphabet: little known. 2. *Turks of the Sandy*

Desert.—Conterminous with Mongolia and Tibet. 3. *Turks of Khoten, Kashgar, and Yarkend.* 4. *Kirghis.*—Independent Tartary: the Kirghis (q.v.) form a portion of the population of the highest table-land in Asia—perhaps in the world—Pamir and the source of the Oxus. 5. *Usbegs* (q.v.). —The Turks of Bokhara. 6. *Turcomans.*—The Persian frontier of Independent Tartary from Balkh to the Caspian: pastoral robbers. 7. *Ottoman or Osmanli.*—The Turks of the Turkish Empire. 8. *Nogays.*—The Turks of the parts between the Black Sea and the Caspian, n. of Caucasus. 9. *Turks of the Russian Empire.*—Bashkirs, Teptyars. Baraba, etc.: with all these, although the language is Turk, there is good reason to believe that the original substratum is Finn: with the Bashkirs, this is generally considered to be the case. 10. *The isolated Yakuts of the Lena.*'

In physical appearance, all these tribes, except the Ottoman T., partake more or less of the Mongolian type. They have in general a broad, flat face, with prominent cheek-bones, the head from side to side nearly equal to its length from the forehead to the occiput, nose flat, eyes small, color of the skin yellowish, straight hair, little or no beard, and stature undersized. It is among the nomad and agricultural T. that these characteristics are most prevalent, while among the more civilized they almost disappear. Prichard quotes Lieut. Wood's account of the Kirghis as a good average description of the primitive Turkish tribes: 'In stature, the Kirghis are under the middle height; of a *kyl* numbering seven men, the tallest was 5 ft. 5½ inches in height. Their countenance is disagreeable; the upper part of the nose sinks into the face, leaving the space between their deeply-seated and elongated eyes without the usual dividing ridge: the brow immediately above the eye is protuberant, but starts back more abruptly than in Europeans; their cheeks, large and bloated, look as if pieces of flesh had been daubed upon them; a slender beard covers their chin; and in those individuals who have more luxuriant hair, the beard has a natural curl. Their persons are not muscular. Their complexions are darkened by exposure to all weathers rather than by the sun. The women are rather good-looking, and of delicate form, like the Hazaras, and make good wives.' The T. of the Turkish empire, especially those of the upper classes, differ considerably from the type here described. The Ottoman T., in fact, in feature, height, and general physical structure, bear strong resemblance to other European nations. This is accounted for chiefly by the custom among them for ages of intermarrying with Circassian females.

The various Turkish tribes speak very nearly the same language; 'so much so, that the Yakut of the Icy Sea is said to be intelligible to the Turks of central Asia, and even of Constantinople.' In religion, the T. are mostly Mohammedans; but the Yakuts are Shamanists; the T. bordering on the Chinese empire are Buddhists; and those of Siberia, Christians of the Russo-Greek church.

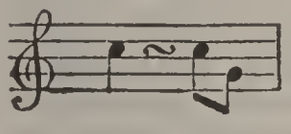
TURK'S ISLANDS: group of small islands in the s.e. part of the Bahama chain; lat. 21°—22° n., long. 71°—73° w. Grand Turk, the largest, is about 100 m. n. of Hayti. The soil of these islands is sterile, and all supplies are imported. The only export is an excellent grade of salt, made by evaporating sea-water in the sun. In 1874 this export exceeded in value the imports, $15,000. Since 1874 the islands, politically, have been controlled by Jamaica.—Pop. about 2,000, with considerable addition during the salt-making season.

TURM, n. *tĕrm* [L. *turma*, a squadron of horse]: in *OE.*, a troop of horse.

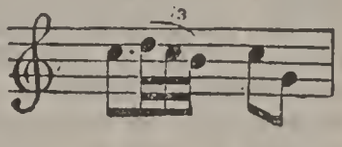
TURMERIC, n. *tĕr'mĕr-ĭk* [F. *terre-mérite;* mid. L. *terra-merĭta*, turmeric—*lit.*, valuable earth: L. *terra*, earth, and *merĭtus*, pp. of *merĕor*, I deserve: or from Hind. *zurd*, yellow; *mirch*, pepper]: plant of the genus *Curcuma* (q.v.), nat. order *Scitamineæ*, native of the E. Indies, much cultivated in India and Cochin-China. The leaves are lanceolate, sheathing each other at the base, about 12 in. long; they spring from the crown of the root, and from their centre rises a short leafy spike, with small cream-colored flowers. The root is divided into several fleshy fingers, oblong, and as thick as a man's thumb, sometimes crooked when young, and the root then abounds in a kind of arrow-root; but in a more advanced stage it contains in large quantity a peculiar, resinous, yellow substance, used as a dye-stuff and for other purposes, and called *Turmeric*. It appears in commerce in the form of dried roots or as a powder. It depends for its value chiefly on a resinous principle, *Curcumin*, scarcely soluble in water, but easily soluble in alcohol and ether. The yellow color obtained from T. is not very durable, though it is employed as a dye for silk and wool. Chemists make much use of T. as a test for alkalis, which change its yellow color to reddish brown, as do also their carbonates and phosphates, some of the alkaloids, and boracic acid. T. test-paper is made by immersing unsized paper in tincture of T.: it is much employed in the East in medicine, as a gentle laxative, diuretic, and stimulant; also as a condiment with many kinds of food; and it is the principal ingredient in *Curry-powder*. For its cultivation T. requires rich friable soil and a situation not liable to be flooded. It is propagated by cuttings of the root, which are planted 18 to 24 in. apart: it is planted in Apr. or May, and the crop is gathered in Dec. This kind of T. is sometimes distinguished by the name LONG T.; and the name ROUND T. is given to *Kæmpferia pandureta*, a plant of the same order, also native of the E. Indies, whose roots are shorter and rounder, but otherwise of very similar quality: they are not nearly so much an article of commerce as the other kind, but are particularly valued for preparation of an artificial gold varnish, as they yield a better color than the long or true T. The Arabic name of T. is *Kurkum*, whence *Curcuma*. TURMERIC PAPER, paper stained yellow with a solution of turmeric, used as a test for free alkali, which changes its yellow to a brown.

TURMOIL, n. *tėr'moyl* [OF. *tremouille*, a mill-hopper, proverbial for the constant racket it keeps up: prov. F. *triboul*, great noise, confusion: OF. *trimar*, disturbance—perhaps from L. *treměrĕ*, to tremble]: disturbance; harassing labor; trouble and confusion; tumult. TURMOIL, v. *tėr-moyl'*, to harass with commotion; to weary; to be disquieted. TURMOIL'ING, imp. TURMOILED', pp. *-moyld'*.

TURN, v. *tėrn* [F. *tour*, a turn; *tourner*, to turn: W. *tworn*, a turn: L. *tornārĕ*, to turn wood; *tornus*, a lathe: Gr. *tornos*, a pair of compasses]: to cause to go round; to move round; to move from a direct course or straight line; to change the direction of; to change to an opposite direction; to change or alter; to change from one condition or state to another, as to *turn* goods into money; to be changed or transformed; to bring the inside out; to put the upper side downward; to form or shape, as by means of a lathe; to translate, as from one language to another; to transform; to cause to loathe or nauseate; to bewilder or make mad, as, it has *turned* his brain; to make giddy; to grow giddy; to expel, as, to *turn* him out of doors; to fall upon by some change; to direct, as the inclination or thoughts; to change, as a party or principle; to persuade; to change, as religion or a course of life; to revolve in the mind; to make sour, as a liquor: N. act of turning; a movement in a circular direction; a bend, as in a road; the twist of a rope round a dent or belaying-pin; a walk to and fro; a change; change of direction; opportunity; convenience, use, or purpose; that which comes to one by rotation or in the course of duty; a good or evil act; a shock or fright; form or cast, as the *turn* of a sentence: in *music*, an embellishment formed by the adjoining notes above and below combined with the principal note, and indicated by the sign ~ Thus



is played thus:



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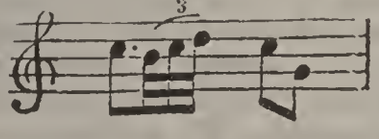
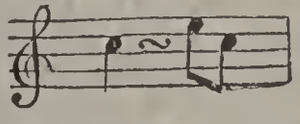


Should another than the principal note follow the turn, the principal note is added before the next note is played, so as to give the turn four notes; thus



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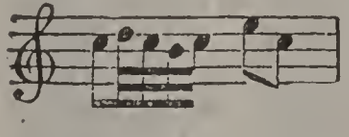
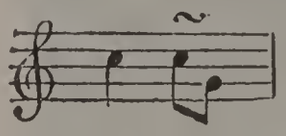


. In either of these cases, the turn must be played during the time of the principal note. But

when the sign ~ is placed above or below the principal note, the first note of the turn takes the place of the principal, which is played in combination with the others; thus

 is played

TURN'ING, imp.: N. a bending course; deviation from the way or proper course; the art or operation of forming by a lathe. TURNED, pp. *tėrnd*. TURNER, n. *tėrn'ėr*, a workman who forms articles with a lathe. TURN'ERY, n. *-ėr-ĭ*, the art of forming articles by means of a lathe; things made by a turner. TURN'KEY, n. [*turn*, and *key*]: one who has the charge of the keys of a prison, and opens and locks the doors. TURN'COAT, n. [*turn*, and *coat*]: one who forsakes his party or changes his principles TURN-COCK, the official of a district or parish who has the charge of the keys of the water-plugs. TURNOVER, a kind of pie or tart made in the form of a half circle; so called because made by turning one-half of a circular crust upon the other; overthrow, as from a vehicle; an apprentice who enters the service of another master to fulfil his apprenticeship; the earnings of any business for a certain period. TURN'PIKE, n. [*turn*, and *pike:* originally a cross of two bars armed at the ends with pikes, and turning on a pin, to hinder horses from entering]: a gate or bar across a road to hinder passage till toll be paid (see HIGHWAY). TURNPIKE ROAD, a public road on which tolls (q.v.) are established. TURNPIKE STAIR, a turret stair which winds round a central newel; a spiral or winding stair. TURNSPIT, a person who turns a spit; a variety of the dog kind, formerly so employed. TURN'STILE, a revolving frame across a footpath for the purpose of admitting foot-passengers only. TURNSTONE, a bird of the plover family. TURN-TABLE, a large revolving platform on a railway for altering the direction of carriages or locomotives. TURNING-POINT, that which decides a matter. TURN-OUT, act of coming forth; an equipage; a quitting of employment, as by a body of workmen, on account of some grievance real or alleged; the net quality of produce yielded; in *rail.*, a siding; a switch; a place for one train or car to turn out while another passes. BY TURNS, one after another; alternately. TO A TURN, exactly; perfectly. TO TAKE TURNS, to take the places of one another alternately. TO TAKE A TURN, to take a short walk. TO TURN A PENNY, to gain money by trade, however small the amount. TO TURN ABOUT, to move the face to another quarter, or in another direction. TO TURN ASIDE, to avert; to deviate from any course. TO TURN AWAY, to dismiss, as from service; to avert; to deviate from any course. TO TURN BACK, to turn round; to proceed in a direction contrary to that already travelled. TO TURN DOWN, to fold or double down. TO TURN IN, to fold or double; in *familiar language*, to go to bed; in *OE.*, to depart from the way; to deviate. TO TURN OFF, to dismiss

or put away; to divert or change, as a course; to hang a criminal. To BE TURNED OF, to be advanced beyond, as to be turned of thirty. To BE TURNED OFF, to be discharged, as a workman. To TURN ON, to charge or set running. To TURN ON or UPON, to reply or retort. To TURN OUT, to drive out; to expel; to strike, as workmen; to put to pasture; to make or finish for use, as goods; to rise from bed. To TURN OVER, to transfer; to open and examine; to overset. To TURN OVER A NEW LEAF, to begin a fresh or a new course. To TURN TAIL, to retreat ignominiously. To TURN TO, to have recourse to; to apply one's attention to. To TURN THE BACK, to flee; to retreat. To TURN THE BACK UPON, to quit with contempt; to forsake. To TURN THE HEAD, to make giddy; to bewilder; to infatuate. To TURN MONEY, to employ money in business. To TURN THE SCALE, to make the balance incline to one side; to give superiority or success. To TURN THE STOMACH OF, to sicken. To TURN THE TABLES, to reverse success or superiority. To TURN UP, to bend or be doubled upward; to come to light; to happen. GOOD TURN, a beneficial act.—SYN. of 'turn, v.': to revolve; form; shape; metamorphose; transmute; alter; convert; pervert; betake; transfer; infatuate; whirl; reverse; madden; repeal; retort; hinge;—of 'turn, n.': gyration; meander; vicissitude; alteration; chance; hap; occasion; inclination; exigence; shape; manner.

TURNAU, *tûr'now* (Bohem. *Turnóv*): walled town of Bohemia, circle of Jung-Bunzlau; on the e. bank of the Iser, 50 m. n.e. of Prague. It has a church, built 1825, deemed one of the most beautiful in Bohemia. Turnau has manufactures of cotton, woolens, and particularly of artificial gems, which are exported in great quantities to the United States. In a battle here 1866, July, the Prussians defeated the Austrians.—Pop. about 5,000.

TURNER, CHARLES YARDLEY: American artist: b. Baltimore, Md., 1850, Nov. 25. He studied in Paris with Laurens, Munkacsy, and Bonnat. He is a member of the National Academy of Design; American Water Color Society; American Etching Club; and National Society of Mural Painters. At the Buffalo Pan-American Exposition (1901) he was director of color.

TURNER, HENRY MCNEAL: American bishop of the African Methodist Episcopal Church: b. Newberry Court House, S. C., 1834, Feb. 1. He educated himself by dint of earnest perseverance and was licensed to preach by the Methodist Church South in 1853. In 1858 he transferred his membership to the African Methodist Church and studied the classics, Hebrew and divinity at Trinity College. He was the first colored chaplain ever commissioned, and after being mustered out in 1868 was then commissioned chaplain of the regular army. He sat in the Georgia legislature in 1868 and 1870, and in 1880 became a bishop of his church. He has published *Methodist Polity;* etc.

TURNER *tėrn'ėr*, Joseph Mallard William: greatest of Brit. landscape-painters: 1775, Apr. 23—1851, Dec. 19; b. 26 Maiden Lane, Covent Garden, London; son of a barber. He received little or no education beyond a few months' schooling at New Brentford and Margate. His turn for art showed itself very early, and attracted attention and kindly assistance. In after-life T. used to express his obligation to a certain Dr. Monro, who gave him access to his excellent collection of water-color drawings, and otherwise helped and encouraged him. In 1789 he became a student at the Royal Acad., where, doubtless, he learned something; but he seems to have been indebted for his success less to formal teaching than to the tentative efforts of his own singularly original genius. In 1787, when only 12 years old, he exhibited two drawings at the Royal Acad. Again, 1790, he exhibited; and thenceforward till his death, his pictures were regularly found on the walls. His success is shown by the fact that in 1799, when only 24 years of age, he was elected an associate of the Royal Acad., and three years afterward attained the full dignity of academician. The honor was worthily bestowed, as he was already admitted to be the first landscape-painter of his time; but his appointment 1807 to the post of prof. of perspective was scarcely judicious. A man so illiterate that his simplest note included a crop of solecisms was not likely to succeed as a lecturer; and as a lecturer he failed utterly. He possessed abundant knowledge, but could not communicate it, and after a very few years he ceased from the attempt. In the exercise of his art, T. travelled much; he was frequently in Scotland, France, Switzerland, and the Rhine countries; and 1819, 29, and 40, he visited Italy. His industry was almost as great as his genius. To the exhibitions of the Royal Acad. he contributed 259 pictures; but among these many of his finest works were not included; and in another branch of art his achievements were extraordinary. In 1808 he began the publication of his famous *Liber Studiorum*, series of engravings from original designs, which ranks as one of his most important undertakings; to this is to be added his *Scenery of the Southern Coast, England and Wales, Rivers of England, Rivers of France*, etc.; and his services were continually in request as an illustrator. The illustrated edition of Rogers's *Poems* is his most celebrated work in this kind. His last years were passed at Chelsea, in a small house by the river-side. He bequeathed to the nation the noble collection of his works, and they now occupy a room in the National Gallery, a permanent monument of the power and splendor of his genius. The large fortune, about £200,000, which he had amassed by his industry and thrift, he intended to be used in founding an asylum for decayed artists; but, owing to some technical defect in his will, this purpose could not be carried out.

Of the genius of T., and the various phases through which it was developed, we cannot here attempt to treat. In Ruskin's *Modern Painters*, the subject will be found

thoroughly and eloquently discussed. There are lives of Turner by Walter Thornbury (1861) and by P. G. Hamerton (1879). The picture presented, especially by the former, is a somewhat dark and painful one. This creator of the beautiful on canvas is represented as coarse, sensual, sordid, avaricious; but the few friends who knew him intimately, regarded him as essentially a man of generous nature who never lost an opportunity of doing a kindness. His obvious eccentricities probably occasioned some misunderstanding of his real character. Ruskin—his intimate friend of ten years—gives him high praise. He lies buried in the crypt of St. Paul's, beside Sir Joshua Reynolds.

TURNER, Philip: surgeon: 1740, Feb. 25—1815, Apr. 20; b. Norwich, Conn. He was educated for a physician and surgeon by Dr. Elisha Tracy; was asst. surgeon to a provincial regt. in the old French war, at Ticonderoga, 1758; practiced at Norwich 1763–75; was surgeon-in-chief of the Conn. troops before Boston 1775; accompanied the continental army to New York, and served in the battles of Long Island and White Plains 1776; and was surgeon-gen. of the e. dept. from 1777 till near the close of the war. He settled in New York 1800, and was staff surgeon U. S. A. in the war of 1812–15.

TURNER, Samuel Hulbeart, d.d.: 1790, Jan. 23—1861, Dec. 21; b. Philadelphia: educator. He graduated at the Univ. of Penn. 1807; was ordained deacon in the Prot. Episc. Church 1811 and priest 1814; held a charge in Chestertown, Md., 1812–17; and was supt. of the divinity school in Philadelphia 1818. The same year he was appointed prof. of historic theology in the General Theol. Seminary of the Prot. Episc. Church. He accompanied the institution in its removal to New Haven 1820, and in its return to New York 1821; and on its reorganization he was appointed prof. of biblical learning and interpretation of Holy Scriptures, and held the chair till his death. He was also for some time prof. of Hebrew language and literature in Columbia College, New York.

TURNER, Sharon: Anglo-Saxon historian: 1768, Sep. 24—1847, Feb. 13; b. London. At the age of 15 he was articled to an attorney, and succeeded his master in the business before his clerkship had expired. He was successful as an attorney, but gave his leisure to historical, archæological, and philological research. After years of hard reading and patient collection of materials, he published 1799–1805. *History of the Anglo-Saxons*, 3 vols., a work, which, with all its imperfections, has given T. a permanent place in English literature. Other writings by him are: *The History of England from the Norman Conquest to* 1509 (1814); *History of Henry VIII.* (1826); and *Reigns of Edward VI., Mary, and Elizabeth* (1829)—all repub. under the title *History of England from the Earliest Period to the Death of Elizabeth; Sacred History of the World as Displayed in the Creation and Subsequent Events to the Deluge* (1832 *et seq.*); vol. of essays and poems; etc.

TURN'ER, Thomas: naval officer: 1808, Dec. 23—1883, Mar. 24; b. Washington, D. C. He entered the U. S. navy as midshipman 1825; was promoted passed midshipman 1831, lieutenant 1835, commander 1855, captain 1862, commodore 1863, and rear-admiral 1868; and was retired 1870, Apr. 21. He was in the *Macedonian* exploring expedition 1837-8; the destruction of Malay pirates' towns on Sumatra 1839; commanded the *Reefer* in the attack on Tuspan, Mexico, 1847; captured two blockade runners at Vera Cruz 1860; and commanded the *New Ironsides* in the operations before Charleston 1863, Apr.—Aug. As commander of the s. Pacific squadron, 1868-70, he rendered much-needed service to the sufferers by the great earthquake in Peru.

TURNER, Sir William: English anatomist: b. Lancaster 1832. He received his general education in private schools, and began the study of medicine in St. Bartholomew's Hospital, graduating with distinction in the University of London in 1857. He became a member of the Royal College of Surgeons in 1853, and in the following year was appointed demonstrator in anatomy in the University of Edinburgh. In 1903 he was elected principal of the university. Since 1873 he represented his university on the General Medical Council, of which he became president in 1898. He presided over the meeting of the British Association at Bradford in 1900, and delivered an address on the progress of the cell-theory in biology. He was one of the founders, and is joint-editor of the *Journal of Anatomy and Physiology,* and has contributed many papers to the transactions of learned societies. He has published *An Introduction to Human Anatomy* (1875); *Lectures on the Comparative Anatomy of the Placenta* (1876); and an *Atlas of Human Anatomy and Physiology.*

TURNER'S FALLS: manufacturing village in Montague tp., Franklin co., Mass.; on the Connecticut river, and on the Fitchburg and the Connecticut River railroads; about 3 m. n.e. of Greenfield, the county-seat, and 38 m. n. of Springfield. The falls of the river here furnish immense water-power for lumber-mills, large paper-mills, a cotton factory, foundries and machine-shops, one of the largest cutlery manufactories in the world, and a turbine-wheel factory. In its vicinity are found valuable fossil specimens.—Pop. 6,200.

TURNHOUT, *tėrn'howt:* well-built town of Belgium, province of Antwerp, 25 m. e.n.e. of Antwerp; in the dist. known as the Campine (see Belgium); terminus of a branch-line of the Brussels and Antwerp railway. The inhabitants manufacture ticking, and linen and lace goods, cutlery, playing-cards, paper, oil, etc. Turnhout is historically noteworthy as the scene of two battles—the first, 1597, Jan. 22, won by the Netherlands, under Maurice, Prince of Orange, over the Spaniards; the second, 1789, Oct. 27, by the patriots, under Van der Mersch, over the Austrians.—Pop. (1901) 21,000.

TURNING.

TURN'ING: art of shaping wood, metal, ivory, or other hard substances into forms having a curved (generally circular or oval) transverse section; and also of engraving figures composed of curved lines on a smooth surface, by means of a machine called a *turning-lathe*. This art is of great importance and extensive application in mechanics, the most delicate articles of luxury and ornament, equally with the most ponderous machinery, being produced by it. The art of T. dates from a very early period, and Theodorus of Samos, about B.C. 560, is named by Pliny as its inventor; but long before this period, the *potter's wheel* (see POTTERY), earliest and simplest form of T.-machine, was in general use, as is evidenced by numerous references in the Old Test. The immense variety of work performed by T.-machines necessitates great variations in their construction; but their mode of operation is always the same, and consists in fixing the work in position by two pivots or otherwise, causing it to revolve freely round an axis of revolution, of which the two pivots are the poles, and holding a chisel or other cutting-tool so as to meet it during its revolution, taking care that the cutting-tool be held firmly and steadily, and moved about to different parts of the work till the required shape be obtained. Lathes are divided, with respect to the mode of setting them in motion, into *pole*-lathes, *foot*-lathes, *hand-wheel* lathes, and *power*-lathes: with respect to the species of work they have to perform, into *centre*-lathes, which form the outside surface, and *spindle, mandrel,* or *chuck* lathes, which perform hollow or inside work; though this distinction is for the most part useless, as all lathes of good construction are now fitted for both kinds of work. *Bed*-lathes are those used by turners in wood, and *bar*-lathes for the best sort of metal-work; and the small metal centre-lathe employed by watch-makers is known as a *turn-bench*.

The primitive and most simple form of lathe for wood-cutting is the pole-lathe. It consists of two planks or beams placed horizontally side by side with a narrow space between them, which, being firmly supported at a convenient height, constitute the *bed;* of two uprights or *puppets* rising from the bed, one of them stationary at the left end, and the other sliding along over the slit between the beams, and capable of being fastened at any required point by a projecting tenon and wedge beneath; of a *treadle* below and parallel to the bed; and of an elastic *pole* or *lath* (whence some derive the name lathe) fixed to the ceiling above. This form of lathe is well adapted for turning long thin cylinders of wood, the piece to be turned being held fast at each end by the conical iron or steel point projecting from the inner face of each puppet. Motion is communicated to the work by a cord fastened to the lath overhead, wound twice or thrice round the work, and then attached to the treadle below. When the workman presses his foot on the treadle, the work commences to revolve rapidly, unwinding the cord toward the treadle, and winding it up on the side next the pole, causing the latter to bend considerably. During this period, the workman has been holding his cutting-

instrument to the work; but after the treadle has been quite pressed down, he removes his foot, and the reaction of the bent pole causes the work to revolve in an opposite direction, till the pole has straightened itself; and during this latter revolution no cutting is done. When the whole piece is to be turned, the cord must be moved from an unfinished to a finished part of the work. For the pole, an elastic steel bow and string are substituted when the work is light or fine, the cord being attached to the middle of the string, and the bow fastened to the ceiling by its centre. The advantage of the pole-lathe is, that it never acquires an impetus in the direction of the cutting motion, for whenever the pressure on the treadle is removed, the reaction of the pole takes effect; but the great waste of time during the straightening of the pole and rising of the treadle has caused the abandonment of this machine for the foot-lathe. The foot-lathe, the most common and generally useful form of lathe, differs from the former in having a *head-stock* or *fast-head* in place of the left-hand stationary puppet. This head-stock, HH (fig. 1), consists of two supports or pup-

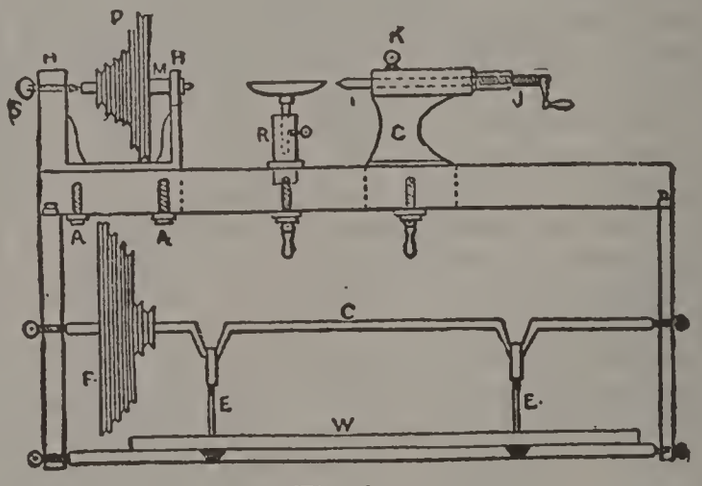


Fig. 1.

pets firmly connected at their base, and fastened at right angles to the bed by means of the screws A, A; the outer puppet is pierced for the screw S; and the inner is supplied with a steel collar, within which the mandrel, M, which carries the speed-pulleys, P, turns. The left end of the mandrel is concave, so as to allow the steel point of the screw S to fit closely. R is a *rest*, which slides along the slit between the two beams of the bed, and may be clamped at any point, and elevated or depressed as is found necessary. The rest is used by the workman for leaning his cutting-tool upon, in order to afford it greater steadiness. G is the right-hand puppet *front-head* or *tail-stock*, movable along the slit in the bed, and capable of being fastened like the rest; its point, I, can be advanced or retired as required by means of the screw J. C is the spindle, which, being connected with the treadle, W, by means of the rods or chains, E, E, turns the fly or foot wheel, F, and, by means of an endless band connecting the latter with the speed-pulleys, communicates motion to the mandrel. The pulleys on the spindle and mandrel are of different sizes, and so arranged that,

when the endless band is placed on the left-hand pulleys, an extremely rapid motion is communicated to the mandrel, the motion being reduced more and more as the band is transferred more to the right, till, at the extreme right, the rotatory motion is much slower than that of the spindle. When the foot-lathe is required for centre-work, the inner end of the mandrel is furnished with a point similar to I; but when hollow or inside work is to be done, it must be armed with a screw, as in the figure: in this latter case, certain contrivances known as *chucks*, for holding the work, are screwed on to the end of the mandrel. Some of these most commonly used are the *screw-chuck*, which shows on its right side a flat circular surface, from the centre of which projects a large, coarse, conical screw for holding firmly any large piece of wooden work; the *hollow chuck*, a strong circular cup with perpendicular sides, into which one end of the work is firmly fastened by a mallet, or, if too small, by four screws working inward through its sides; the *drill-chuck*, of cylindrical form similar to the last, but with a square cavity for holding drills—the instrument, and not the work, being made to rotate in this instance; and the *concentric chuck*, an ingenious piece of mechanism—a flat plate with two slits almost to the centre, and in line of a diameter, within which slits works a spindle with screw-ends carrying two steel studs, whose heads project through the slits above the surface on the right side; these heads carry two curved pieces, which

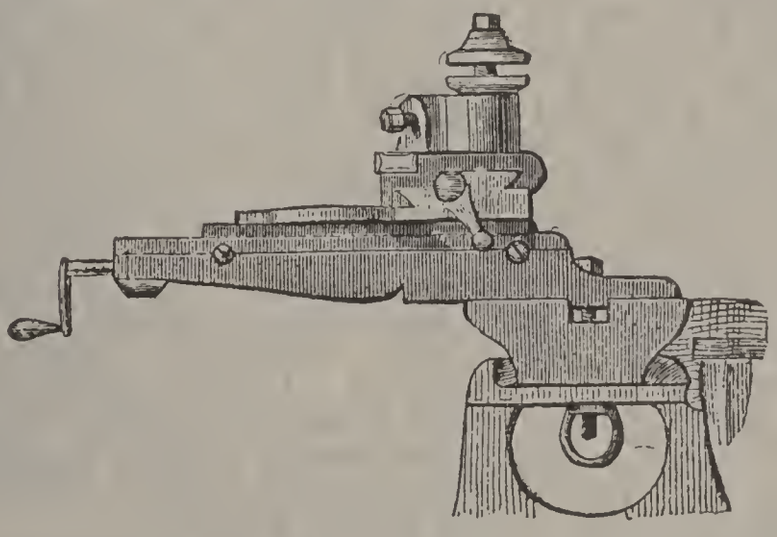


Fig. 2.—Slide-rest.

serve as clamps to hold the work; and as the spindle-screws are of the same fineness, and with right and left threads, the revolution of the spindle either removes both further from the centre, or brings both nearer to it; hence, when the studs are once set at equal distances from the centre, they always remain so, and the work may be removed and replaced without danger of destroying the adjustment. All these chucks are of metal, and are mostly employed for heavy work; turners of wood or ivory preferring wood-chucks, which can be altered as required, and secured by an iron ring round the outside, to prevent splitting. The cutting-tools employed are very various:

gouges are used to rough out the work—if soft wood—after which chisels with a straight oblique edge are employed: the instruments for harder materials, such as ivory or bone, are smaller than the former, and have their sharp edges 'better backed;' for inside-work, drills are first used to make an opening, and then cutting-tools of various shapes are used, according to the form which is to be given to the interior surface. To avoid the imperfections in workmanship arising from unsteadiness of hand in the workman, the *slide-rest* (fig. 2) is employed. This valuable addition is furnished with two motions, one toward the work, the other along, parallel, or at any inclination to it, according as cylindrical or conical figures are required; there is a socket for the chisel, which is firmly held in its place by a screw; and after the slide-rest has been adjusted, the operator has only to move the rest forward or sideways, as may be required, the motions being effected by two screws and winches.

The *hand-wheel* lathe is similar to the former, but so much larger as to require two workmen, one of whom is employed in setting the instrument in motion by turning a wheel, which corresponds to the wheel F in fig. 1. The *power*-lathe is similarly set in motion by horse, water, or steam power, and is employed for heavy metal-work, as piston-rods, iron columns of various kinds, wheels, artillery, etc. This machine differs from the foot-lathe chiefly in the substitution of rack-work, and wheels and pinions, for the endless band, and for manual labor, in the various adjustments of the machine, such as in moving forward the tail-stock, etc.; and in the mandrel being supported by both puppets of the head-stock. In wood-turning, the wood, first prepared by a hatchet and rasp, must be lightly though firmly pressed against by the cutting-tool; while metal-work must be cleaned from the sand of the mold or scales of the forge, and in turning requires less care. Soft woods must be made to revolve with great rapidity; very hard woods and brass require much less velocity; wrought-iron and copper, still less; steel, a further diminution of speed; and cast-iron, the least velocity of all. After the work has been duly shaped, it requires to be polished; and this is effected while it is still in the lathe and rotating, by applying shark's skin to wood, pumice-stone and chalk to ivory and horn, and emery, tripoli, or putty powder to metals.

Hitherto we have supposed that the axis of revolution of the work is fixed, and consequently that all work has been turned so as to present a transverse circular section; but many other forms of section may be easily obtained. The general mode of obtaining these non-circular figures is by screwing on to the mandrel an apparatus, by means of which the work can be thrown out of the centre of rotation at regular intervals; but as each different class of form requires a separate kind of apparatus, it is impossible here to describe the operations in detail. One species, however, known as *rose-engine turning*, and employed for producing involved curvilineal figures, such as appear on bank-notes and on ornamented gold, silver, or gilt work, is so peculiar

and ingenious as to call for more special notice. In this species, the standards which support the mandrel are no longer fixed at right angles to the bed, but are capable of oscillating forward or backward in a plane parallel to the plane of rotation of the mandrel, and are so acted on by a spring that when pushed to one side they are at once restored to their former position on the pressure being withdrawn. Suppose, then, a metal wheel with its rim waved or indented, fastened concentrically on the mandrel, and the mandrel, pushed aside by a fixed steel point or roller, applied to the rim of the wheel; the reaction of the spring against the pressure of the roller will keep the latter in close contact with the waved rim throughout, and will produce a definite oscillatory movement of the mandrel, of the chuck and the work fastened on it, and consequently—the cutting or graving tool being firmly held by the slide-rest—definite deviations from a circle in the lines marked on the face of the work. The wave-rimmed wheel, called a *rosette*, may be replaced by another, and that by a thir, dand so on till a sufficient number of different waved lines are obtained. A number of rosettes are generally strung at once on the mandrel, and the fixed guide is brought into gearing, by means of a steel band called a rubber, with one rosette after another. Similar concentric curves of greater or less perimeter are obtained by removing the slide-rest from, or bringing it nearer to, the axis of revolution.

TURNIP, n. *tĕr'nĭp* [probably Eng. *turn*, in the sense of round, and L. *nāpus;* F. *navet*, a turnip]: biennial plant of genus *Brassica* (q.v.), with lyrate hispid leaves; the upper part of the root becoming, especially in cultivation, swollen and fleshy. It is a native of Europe and temperate parts of Asia, has been long cultivated, and is to be found in almost every garden of the temperate and cold parts of the world as a culinary esculent. It is extensively grown also in fields for feeding cattle and sheep. Its introduction into Britain as a field crop marked a great improvement in the agriculture of that country. In the United States it has not assumed great importance, as, for main products, corn, potatoes, and other crops can be grown to much greater advantage. In gardens the T. is grown for use in summer and winter. For the summer, seed is sown as soon as the ground is dry, in a rich and carefully prepared soil. About 2 lbs. of seed per acre should be sown in drills 15 in. apart. After the plants are well started, they are to be thinned to stand 3 to 5 in. apart in the rows. For the fall and winter supply, seed is to be sown in July or Aug., according to latitude. Land from which early garden crops have been removed, or which has produced a crop of grain or early potatoes, is often used for a late T. crop. The ground should be plowed, dressed with well-rotted manure or commercial fertilizer, and the surface well pulverized. When the T. is grown as a farm crop, seed is sown broadcast at the rate of 1 lb. per acre; but, to facilitate sowing, it is carefully mixed with 8 qts. of sand. Covering is done with a bush harrow or, preferably, with a roller. The T. is grown often as a 'stolen crop' between rows of corn, the seed being sown

when the corn is hoed the last time. Seeding to grass is sometimes done when the T. seed is sown, in order to secure two crops with a single preparation of the soil. The principal enemy of the crop is the T.-fly (q.v.). The yield of the T. crop in field culture varies from 200 to 1,000 bushels per acre. In England the crop is fed from the land by sheep which are confined to certain portions of the field by movable fences. In the United States it is necessary to harvest the crop before sharp frosts occur. The tops should be cut off, and the bulbs stored where it is dark and cool, and covered with a little earth. From those designed for table use the central bud should be removed when they are stored, as this will greatly improve their keeping qualities. If grown in large quantities, turnips should be stored in a trench or a root cellar. Before they are fed to stock, they should be passed through a machine for cutting them (see TURNIP-CUTTER). Seed should be grown only from the finest bulbs. These should be set, early in spring, in rows 3 ft. or more apart, and 1½ ft. apart in the row, and by cultivation and hoeing be kept free from weeds during the season. To keep the varieties pure, the different kinds, when grown for seed, should be at quite a distance from one another.

The ruta-baga, known also as the Swedish, Russian, and French T., is grown in gardens and as a field crop, has smooth leaves, is larger than the ordinary T., has a firmer texture, is more nutritious, and requires a longer season in which to mature. Seed is sometimes sown where the plants are to stand, but it is better to sow it in drills, in June or early in July, and 4 to 6 weeks later set the plants in ground prepared as for the common T., 1 ft. from each other in rows 3 ft. apart. They should be cultivated and hoed several times during the season of their growth.

The common T. contains about 92 per cent. of water, and the ruta-baga about 87 per cent. In 1890 the seed-dealers of the United States had on their lists about 50 varieties of the common T. and about 30 of the ruta-baga.

TURNIP-CUTTER: implement used for cutting turnips and other bulbs and roots for cattle. Many kinds are in use, of which perhaps the best are those having knife-edges on the surface of a cylinder or cone, which are brought to act on the turnips by turning a handle.

TURNIP-FLY: any one of several insects destructive to turnips. The name is given often to *Altica* (or *Haltica*) *nemorum*, called also TURNIP-FLEA, from its skipping or leaping powers, but which is truly a very small beetle, with long and strong hind-legs, and ample wings of shining black color, with two yellowish stripes down the wing-cases, and ochreous legs. It swarms in meadows and hedge-rows in most parts of Britain from Mar. to Oct., the larva feeding on many cruciferous plants. It often commits great ravages in turnip-fields while the turnips are very young. The female lays her eggs on the underside of the leaf, and the minute larva mines in the leaf. Its attacks may be prevented by sprinkling lime-dust over the leaves when they are wet with dew. This is to be done

intervals of 3 days from the time when the plants appear till they put out their rough leaves.

The TURNIP-FLY, properly so called, is *Anthomyia radicum*, dipterous insect of family *Muscidæ*, and of the same genus with the Cabbage-fly and Beet-fly. It attacks the root of the turnip, as the Cabbage-fly does that of the cabbage, the larva living in the root.

TUR'NIP SAW'FLY: see SAWFLY.

TURNKEY, TURNPIKE: see under TURN.

TURNSOL, or TURNSOLE, n. *tėrn'sōl* [F. *tournesol;* It. *tornasole*, the turnsol—from F. *tourner;* It. *tornare*, to turn, and L. *sol;* It. *sole*, the sun]: a plant of the genus *Heliotropium*, ord. *Boraginaceæ:* so named because its flower is supposed always to turn toward the sun; a plant, *Crozophŏra tinctōrĭa*, ord. *Euphorbĭācĕæ*, the juice of which becomes blue on the addition of ammonia and exposure to the air; a deep purple dye obtained from this plant.

TURNSPIT, TURNSTILE, TURN-TABLE: see TURN.

TURNSTONE, *tėrn'stōn:* bird of the genus *Strepsilas*, of the Plover family (*Charadriadæ*), distributed in almost every part of the globe. It appears in Britain, chiefly as a winter bird of passage, but breeds occasionally in the Shetlands. It frequents the sea-shore, and is named from its habit of turning over small stones with its bill in search of food. It is the only known species of its genus. The eggs, four in number, are laid on lonely rocky coasts where there is sparse vegetation. They vary greatly in color and markings, and are cunningly concealed. The whole length of the T. is rather more than eight inches. The plumage varies with the age of the bird and the season: in Aug. the plumage begins to become dull. The T. is common in N. America, and is known as beach-bird, calico-jacket, redlegs, creddock, and many other popular names.

TURPENTINE, n. *tėr'pĕn-tīn* [Dut. *terpentijn;* Ger. *terpentin*, turpentine—from L. *terĕbin'thus;* Gr. *terĕbin'thos*, the turpentine-tree: It. *terebinto:* F. *térébinthe*]: an oily resinous substance flowing naturally, or by incision, from several species of trees, as the pine, the larch, the fir, etc. The chief varieties of turpentine are *Common Turpentine*, yielded by *Pinus abies; Venice Turpentine*, yielded by the larch; *Bordeaux Turpentine*, yielded by *Pinus maritima;* and *Chian Turpentine*, yielded by *Pistacia lentiscus.* The Venice turpentine, regarded as the best, occurs as a clear, transparent, pale-yellow, viscous mass, of balsamic odor and acrid bitter taste, perfectly soluble in spirits of wine, and increasing in density on prolonged exposure to the air. On distilling it with water, it yields considerable essential oil, vulgarly known as *spirits of turpentine.* This *oil of turpentine* (which, for greater cheapness, is obtained usually from common turpentine) is, after rectification, represented by the formula $C_{10}H_{16}$, and has a sp. gr. of 0·8749, and a boiling-point of 311° F. It is colorless, transparent, has strong refractive power, strong peculiar odor, and disagreeable acrid taste. It is readily soluble in alcohol, in ether, and in the fixed and essential oils, but is

insoluble in water, on which it floats. It is a good solvent for many substances, especially sulphur, phosphorus, caoutchouc, and the various resins; and is largely used in many departments of the arts, forming a large proportion of all oil paints. Great quantities are exported from the United States, where it is yielded mostly by the Swamp-pine.

T. is an energetic producer of Ozone (q.v.); and on keeping it for a long time in a stoppered flask, which should be occasionally shaken, the odor of ozone is very distinct on opening the vessel. Amer. or French oil of T., left in contact with water, is changed into a crystalline compound, $C_{10}H_{16}3H_2O$, called terpinhydrate. Commercial oil of T. often consists of a mixture of several isomeric hydrocarbons which act oppositely on polarized light (like the several varieties of sugar). Deville and Berthelot have ascertained that there are various modifications of which this oil is susceptible without any change in its chemical composition. Of these, *isoterebenthene* and *metaterebenthene*, differ *inter alia* in their boiling-points, and may thus be separated; *terebene* (with odor resembling that of oil of cloves) and *colophene* are obtained by acting on the oil with sulphuric acid; and *camphilene* and *terebilene* by decomposing artificial camphor (which is a combination of the oil with hydrochloric acid) by means of quicklime.

Under the influence of nitric, hydrochloric, and sulphuric acids, chlorine, etc., oil of T. yields many products of interest to the chemist, but as yet of little practical value.

Oil of T. is used in medicine, though, from its disagreeable taste, and from certain bad effects which occasionally follow its use (as strangury, bloody urine, vertigo, a species of intoxication, and an eruption on the skin), it is often supplanted by less certain remedies. It is probably the most effective remedy for expulsion of tapeworm, is nearly equally efficacious over the lumbrici or round-worms, and, in the form of an injection is serviceable in the case of ascarides or thread-worms. For an adult, in a case of tapeworm or round-worm, the dose should be one ounce, combined with an equal quantity of castor-oil, or made into an emulsion with yolk of egg or mucilage. In the case of children and delicate women, it is better to try a milder vermicide (see VERMIFUGES). In doses from two drams to two ounces, and in similar combination with castor-oil, it may be given as a cathartic in obstinate constipation, especially when dependent on affections of the brain; in hysteria, epilepsy, tympanitis, passive hemorrhage, and in purpura hæmorrhagica. In small doses (10 to 20 minims), oil of T. is regarded as a diuretic; but it must be given with caution, because of its stimulating properties. It is of more service in chronic mucous discharges of the genito-urinary organs, as gleet, leucorrhœa, etc., than in dropsy. In small doses, it is often useful in chronic rheumatism and in sciatica. In the Dublin school, it has been much employed in small and repeated doses as a general stimulant in low stages of continued fever. *Turpentine Punch* has long been a favorite remedy in these cases in the Meath

Hospital (where Graves and Stokes made their reputation): it is composed of an ounce of oil of turpentine, two ounces of brandy, eight ounces of boiling water, with sufficient sugar. A third of this should be taken for a dose, and should be repeated, if necessary, every third hour. When applied externally, oil of T. is a speedy and powerful rubefacient and counter-irritant, and is beneficially used in this capacity in inflammatory attacks of the throat, chest, and abdomen. The best mode is to rub the oil by means of a bit of flannel over the part to be acted on; over this to lay three or four folds of flannel, wrung out of hot water, and over the flannel to place a dry towel: two or three such applications produce a sufficient result. There is a *Liniment of Turpentine* which is powerfully stimulating, and is applied as a dressing for extensive burns; and is used likewise, with friction, in rheumatic and neuralgic cases. There is also the *Liniment of Turpentine and Acetic Acid*, official representative of the *St. John Long's* liniment, an excellent counter-irritant (applied with a sponge) in pulmonary consumption and other chronic pulmonary affections. *Ointment of Turpentine* is a warm stimulating application.

It was mentioned at the beginning of this article that on distilling T. with water the oil comes over. The residue left in the retort constitutes common *resin* (or *rosin*), known also as *colophony:* see RESINS.

TUR'PENTINE-TREE: see PISTACHIA.

TURPETH, n. *tĕr'pĕth*, or TURBETH, n. *tĕr'bĕth*, and TURBITH, n. *tĕr'bĭth* [F. *turbith*—from Pers. *turbed*, a purgative root]: the yellow basic sulphate of mercury—so called from its yellow color, which resembles the root of the *Convolvulus turpethum* or vegetable turpeth.

TURPIN, n. *tĕr'pĭn:* same as TERRAPIN.

TURPIN, *tĕr'pĭn:* Archbishop of Rheims, friend and companion of Charlemagne, an eye-witness of the exploits that he relates—such are the names and qualifications assumed by the author of a chronicle in Latin prose narrating the expedition of the Frankish emperor against the Saracens of Spain, and particularly the events that proceeded and followed the battle of Roncesvalles (q.v.): see also ROLAND, LEGEND OF. There is great uncertainty about the identity of Abp. T., and about the authorship of the 'History' of Charlemagne and Roland. Some writers incline to identify T. with Abp. Tilpin of Rheims (b. in the first half of the 8th c., d. 794?).—Others see evidence that the 'History' (legend) was falsely attributed to T., and was a product of the 11th c.—written, or at least partly written, by Pope Calixtus II. while he was Abp. of Rheims, about 1090. On this theory, the chronicle was made up from the purer legends and ballads of the Carlovingian times. It soon acquired great popularity, was transl. into French after 1206, and was used by divers chroniclers. The chronicle is of great historic value, not withstanding all its later embellishments; for, as one of the most ancient traditions of the time of Charlemagne, it has

preserved numerous traits and details with much fidelity. The chronicle has been printed in Reuberus's edition of the *Scriptores* (Hanau 1619; Frank. 1726).

TURPIS CAUSA, *tėr'pĭs kaw'zâ:* phrase in law, borrowed from the Roman law, to express an immoral consideration on which some contract or obligation is founded. The rule is, that when an immoral contract is broken, no court of law will assist either party to enforce it. Thus, if one were to let lodgings to a prostitute, with the knowledge that they were to be used for her vocation, he would have no right of action to recover rent.

TURPITUDE, n. *tėr'pĭ-tūd* [F. *turpitude*—from L *turpĭtūdo* or *turpĭtūdĭnem*, ugliness, foulness—from *turpis*, ugly, shameful]: moral baseness; extreme depravity or wickedness; moral deformity; badness.

TURQUOISE, n. *tėr-koyz'* or *tėr-kwoyz'*, or TURKOIS, n. *tėr-koyz'* [from *Turkey:* F. *turquoise*]: a phosphate of alumina with a little phosphate of iron and copper—a highly prized stone, taking a fine polish, and usually of a beautiful sky-blue or greenish-blue color, used in jewelry, and hitherto found only in the province of Khorassan, in Persia. It is essentially a phosphate of alumina, containing also a little oxide of iron and oxide of copper. It is harder than felspar, but softer than quartz, and has a greenish-blue color. It is opaque, or sometimes translucent at the edges: it is sometimes called Oriental T.; while the name Occidental T. is given to a substance of similar color, found near Simon, in Languedoc, said to be merely bone colored with phosphate of iron. It is spelled also TURKIS, *tėr'kĭs.*

TURRET, n. *tŭr'rĕt* [L. *turris*, a tower: OF. *tourette*, dim. of F. *tour*, a tower: W. *twred*, a turret—from *twr*, a tower]: a small tower, often crowning the angle of a wall, etc.; in *anc. warfare*, a movable edifice of wood used in attacking a fortified place. TUR'RETED, a. furnished with turrets; formed like a tower. TURRICULATED, a. *tŭr-rĭk'-ū-lā-tĕd*, or TURRIC'ULATE, a. *-ū-lāt*, furnished with, or having little towers or turrets. TURRILITE, n. *tŭr'rĭ-līt* [L. *turris*, a tower, and Gr. *lithos*, a stone]: in *geol.*, a genus of chambered shells belonging to the ammonite family, and characterized by their straight, spiral, turreted appearance.

TURRETIN, *tū-rĕh-tăng'* (or TURRETINI, *tôr-rā-tē'nē*), FRANÇOIS: Calvinist theologian: 1623–87; b. Geneva; son of Bénédiet T. (1588–1631), Calvinist pastor and theologian. T. made his theological studies in Geneva, Leyden, Paris, Montauban, and Nîmes; settled in Geneva as pastor of an Italian Calvinist chh.; became prof. of theology in Geneva 1653. He was sternly and uncompromisingly rigid in his theology and in his terms of church-fellowship, and was one of the authors of the *Helvetic Consensus*. His influence on theological opinion in his day was very great. His chief work was *Institutio Theologiæ Elencticæ* (3 vols. Geneva 1688; reprinted Edinburgh 1847–8). This closely reasoned work was, until the middle of the 19th c., of very high authority among Calvinistic scholars; and is still of value as a philosophical memorial.

TURRETIN' (or TURRETI'NI), JEAN ALPHONSE: liberal Calvinist theologian: 1674, Aug. 24,—1737, May 1; b. Geneva; son of FRANÇOIS T. (q.v.). He studied theology in Geneva, Leyden, Oxford, and Cambridge; became pastor of the Italian congregation at Geneva, and (1697) prof. of chh. hist., and prof. of theology 1705. He labored to temper the stern orthodoxy of Geneva and to bring about a union of the Lutheran and Calvinist churches. He procured the abolition of enforced subscription to the *Helvetic Consensus*, and in his efforts for union of churches succeeded in inducing his fellow-Calvinists to offer to Lutherans admission to the communion in Reformed churches. On the subject of union he wrote *Nubes Testium de . . . instituenda inter Protestantes Concordia;* two vols. on theology, *Cogitationes et Dissertationes Theol.;* and two commentaries on portions of the New Testament.

TUR'RET-SHIP, or MONITOR: iron-clad ship of war, with low sides, and one or more heavily armored revolving turrets within which are mounted guns of great size. The efficiency of this type of ship lies in the possibility of securing a low freeboard and of heavily armoring the small turrets. Thus there is little exposed to be hit, and that little is so restricted in area that it can be heavily protected. The circular shape of the turrets gives also a deflective effect. The revolving turret as an appliance in naval warfare is of disputed invention. In this country John Ericsson is generally considered the inventor of the system as applied in the monitor class of ships. Theodore R. Timby, native of N. Y., has claimed the invention; and he eventually secured a patent 1862. Not far from this date a similar patent was issued in England to Capt. Cowper Phipps Coles, of the Brit. navy. Capt. Coles perished 1870, Sep., in the capsizing of his turret-ship, the *Captain*, with 600 souls on board, in the Bay of Biscay.

There are two systems of revolving turrets, differing in the method of support. In the American system, as used in the early monitors, the entire turret, with its guns, men, and all, was carried in action by a central spindle extending down to the keel of the vessel. In the English system, now the approved one, the turret is carried by peripheral, slightly coned rollers. These run upon a circular track or bed some distance below the deck, and the bottom of the turret rests on them. A set of rollers with vertical axes bear against the lower periphery to keep the turret from lateral displacement. A species of flange of leather, India-rubber, or some flexible material, is used to exclude water, and prevent it from entering between the turret sides and the aperture in the deck.

In the old days of muzzle-loaders, the guns were run in after each shot, the port-holes were closed, and the guns were loaded. Heavy swinging stoppers were used to close the openings. They were then opened, and the guns were run out and fired.

The modern revolving turret, of which a typical one is here described, is an amplification of the ideas crudely expressed in the original structure. The modern guns are

breech-loading and very much longer than the old type. They are mounted on a special carriage, which really represents a slide and bed plate. They protrude for about half their length from the turret, and are never withdrawn, as there would be no room. The recoil is received by some type of buffer, the hydraulic type being much approved. Two guns is a usual number for a single turret, placed parallel and pointing in the same direction. Their elevation is determined by hydraulic power, a ram acting on their breech to raise or lower it. The ammunition is brought up by a mechanical or hydraulic hoist from the hold. On the outer and lower periphery of the turret is a set of cogs, and with these a massive spur-gear engages, worked by a special turret-turning engine. On top of the turret is the conning-tower: this is a small turret in which two or three officers can be accommodated. It has small sighting or peep holes, and, like the turret below, is heavily armored. Over the guns is the firing officer's position. He looks out of a small cross-shaped opening which acts as a rear-sight. Forward on the turret top is the fore-sight. Near him are various speaking-tubes, electric push-buttons, electric gear for controlling the steering-engines, and apparatus for controlling or directing the elevation of the gun and the rotation of the turret. A few officers in the turret have the whole ship under absolute control. In an engagement the ship would be fought from the conning-tower; the guns would be aimed and fired; then the turret would be turned to present the unperforated side to the enemy while the guns were being loaded. In double-turret ships inter-communication between the two turrets is provided for.

The problem of introducing hydraulic power into a revolving turret has been very ingeniously met by the use of a hollow central spindle, which is fixed, and about which the turret rotates. The water is introduced through this, and is taken from it by an encircling collar which turns around it with the motion of the turret.

The *Florida*, launched in 1901, has a length over all of 243 ft.; on the water line, 225 ft.; maximum beam, 50 ft.; depth amidships, 14 ft.; draught, 12 ft. 6 in.; displacement 3,200 tons. Her twin screws are driven by 2,400 horsepower engines and makes 12 knots an hour. She has a complete machine shop in her interior, where it is possible to make all ordinary repairs without taking her to a navy yard. She is equipped with 12-in. barbettes and 12-in. Hichborn inclined turrets. Her armament consists of two 12-in. guns in a single balanced turret, four 4-in. rapid fire rifles, three 6-pounders and four automatic 1-pounders. Her steel hull is protected by a continuous belt of armor, which is 5½ in. thick 3 ft. below the water line and gradually increases in thickness to the height of the main deck and abreast of the boilers, where it is 1 ft. thick. The *Arkansas*, *Nevada* and *Wyoming* are ships of same class and construction.

See ARMOR-PLATES: NAVIES. MODERN: UNITED STATES NAVY: BRITISH NAVY.

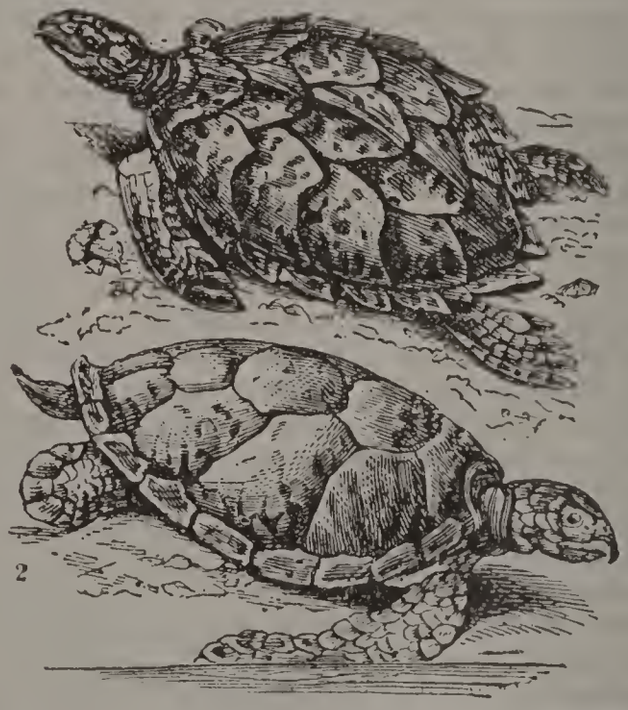
TURRITELLIDÆ, *tėr-ĭ-tĕl'ĭ-dē:* family of gasteropodous molliusks, having a much-elongated spiral shell, the lower spires remarkably separated. The name Turret-shell is often given to them.

TURTLE, n. *tėr'tl* [It. *tortora, tortola;* L. *turtur*, a turtle-dove, the bird that cries *tur, tur*]: the Turtle-dove (q.v.), a species of pigeon noted for the constancy of its affection; the large edible sea-tortoise—called also the green turtle (see below). TURTLE-SHELL, the name of a shell, a beautiful species of *murex;* also tortoise-shell. TURTLE-SOUP, a soup made with the edible turtle; the flesh of the edible turtle added to an ordinary soup-stock. TURTLE-STONES, in *geol.*, flattened nodules of calcareous clay, iron-stone, or other matter, internally divided into numerous angular compartments, often arranged in lines or bands, and generally containing some central organic nucleus, round which the matter has aggregated; called also *septaria.*

TUR'TLE: popular name of any chelonian reptile. The marine turtles have a rather flat carapace, and fin-like paddles instead of legs, suited for swimming, and not for walking. The fore-limbs are much longer than the hind-limbs. The toes are not all furnished with nails; in some species there is only one on each foot, in others there are two. Although turtles lay their eggs on the beach, they seldom visit the shore for any other purpose. They deposit their eggs in holes, which they scoop in the sand with their hind-feet. The eggs are numerous, 150 to 200 often being deposited at a time; and the T. lays several times a year. The young, soon after being hatched, make their way through the sand which covers them, and immediately betake themselves to the water. The eggs are hatched by the heat of the sand alone, and the young receive no attention from their parents. Turtles crawl slowly and awkwardly on the shore; but their movements in water are comparatively quick, and even graceful. Some of the species feed entirely on grass-wrack and seaweeds, which their powerful, hard, and sharp-edged jaws cut with great ease: others prey on crustaceans, mollusks, and fishes. Their jaws are powerful enough to crush very large shells, and the carnivorous turtles are in general more rapid in their movements than the others. The flesh of those which subsist on animal food is musky and unpleasant; but that of the species whose food is vegetable is much esteemed. In many tropical countries, turtles, after being captured, are kept in inclosures to which the tide has access, to be killed when they are wanted. They are capable of subsisting long without food, and are exported alive from the W. Indies, to supply the tables of the wealthy in other lands. In tropical countries, turtles are often very cheap. Their eggs are esteemed for food in the countries where they are found, and are sought by probing the sand with a light stiff cane in places known to be frequented by turtles. Turtles are easily taken when they come ashore for laying their eggs; and one after another may be turned on its back—in which position it is helpless, and cannot make its escape—till a sufficient number is secured. They are also

however, taken in the sea, being cautiously approached by boats when resting, or apparently sleeping, at the surface, or by divers when descried at the bottom in their feeding-grounds. A small harpoon is used, or a rope is thrown over the head of the turtle. Turtles are sometimes pursued by boats in shallow parts of the sea until they are exhausted, the clearness of the water permitting them to be seen even when they dive; and when the boat gets near enough, a man leaps overboard, and seizes the T., clinging with both hands to the shell. It is said that at Mozambique a species of sucking-fish (*Echineis*) is used for catching turtles, a cord being attached to the fish, which is allowed to swim away in the sea, and is sure to fasten itself firmly to the first T. it meets.

The most esteemed T. of the W. Indies is the GREEN T. (*Chelonia midas*), the kind exported for aldermanic and other feasts. The Green T. attains great size, being sometimes six or seven ft. in length, and weighing 700 or 800 lbs. The plates of its carapace do not overlap one another; the central ones are almost regular hexagons. The popular name is derived from the color of the fat, so much prized



1, Hawkbill Turtle (*Eretmochelys imbricata*); 2, Green Turtle (*Chelonia midas*).

by epicures.—Another excellent species of T. is the EDIBLE T. (*Chelonia virgata*) of the Pacific, frequently four or five ft. long.—The HAWKBILL T. (*Eretmochelys imbricata*), found in warmer parts of the Atlantic, in the Indian Ocean, and in the Red Sea, is particularly valuable, as yielding the best Tortoise-shell (q.v.). It is one of those turtles which have the plates of the carapace imbricated, or overlapping one another like tiles. Its flesh, though not so much esteemed as that of the Green T., is good food; its eggs also are very good.—There are other turtles, having the head of a larger size, and the jaws curved toward one an

other at the extremity: of these one is the LOGGERHEAD T. (*Thalassochelys caouana*), native of warmer parts of the Atlantic. Others, again, have the carapace and plastron not hard, but leathery, and sometimes soft enough to yield to the pressure of the finger. One of these is the CORIACEOUS T. (*Sphargis coriacea*) of the Mediterranean and Atlantic: it attains a size even greater than any of the species above described, but its flesh is coarse and unpleasant.

The French, encouraged by their success in pisciculture, have attempted to introduce the Green T. on the s. coasts of France. There has not yet been time to prove the success of the experiment.

Of the aquatic and carnivorous Soft-shelled Turtles, a family found in the Mississippi valley, the Leather T. alone has the edge of the upper jaw serrate behind; the Common Soft-shelled T. and a Tenn. species have the feet spotted, while these are white in *A. ferox*. The family of Snapping Turtles includes the common one (*Chelydra serpentina*), from Canada to Ecuador, and the Alligator Snapper, of the Gulf states and n. to Wis., 40 in. or more in length. The Box T. family (unfortunately named, since it does not include the Common Box T. of dry woods, N. Y. to Mo. and s., placed in the next family) is represented by the Mud T., head with light dots, found from N. Y. to Fla., and the Musk T., w. to Ill., odor strong, and neck with two yellow stripes; also *A. carinatus* of the great valley, with neck unstriped, shell-plates with black radiating lines; in these last two, the shell cannot be closed. Of the Pond Turtles, *Emydidæ*, are the Map T. and another species similar, Le Sueur's, western, both with reticulated yellow markings; the edible Salt-marsh or Diamond-back, plates usually with concentric dark stripes; the Red-bellied Terrapin, N. J. to Va.; the Hieroglyphic Terrapin, with jaws not serrated, as in the last; the Yellow-bellied Terrapin of the Mississippi valley, the plastron with large black blotches; the western Elegant T., yellow beneath, with a blotch on each plate; the Rough T., with wrinkled carapace. Va. to Fla.; the common Painted T., marginal plates with bright red; the eastern Wood Tortoise, shell with both concentric and radiating black lines; the abundant Speckled Tortoise, black with orange spots; also 3 or 4 other species. Of the Land Tortoises, *Testudinidæ*, with fingers and toes bound together by integument, the herbivorous Gopher Turtle is found in the s. states, and n. to N. C. in pine barrens.

TUR'TLE-DOVE, or TUR'TLE: bird of the genus *Turtur*, family *Columbidæ*, having the bill more slender than pigeons, the tip of the upper mandible slightly bent down. They are also more slender and elegant in form than pigeons, and generally smaller; the wings are longer and more pointed; and the tail is longer, rounded, or slightly graduated. There are numerous species, natives of warm climates. Their soft and gentle, yet loud, *cooing* has attracted attention even more than their beauty, and made them a favorite subject of allusion in poetry. *T. risorius*, the most common species in Palestine, and prob-

ably the one intended in the Song of Solomon, is about 10 in. in entire length, with a short tail; the general color gray tinged with red; the upper parts greenish brown, with a black collar on the back of the neck. It is often kept in confinement, and becomes very tame.—Very similar in size and form is the COMMON TURTLE-DOVE (*T. communis*), native of almost all the warmer parts of the old world, a summer visitant of s. Europe and of s.e. England. The tail is long and much rounded; the plumage soft and without gloss, exhibiting finely mingled tints of gray and brown; the crown of the head bluish; all the tail-feathers tipped with white; a black patch on each side of the neck. Other species of turtle-dove, from different parts of the world, as well as these, are frequently kept in confinement, and are very gentle though not very intelligent pets: their cooing resounds through a whole house.

TUSCALOOSA, *tŭs-ka-lô'sa:* city, cap. of Tuscaloosa co., Ala.; at head of navigation on Black Warrior river, and on the Alabama and Great Southern railroad; 55 m. s.w. of Birmingham, 75 m. n.n.w. of Selma. It is in a cotton-growing and coal region; and contains the University of Alabama, State Lunatic Asylum, Alabama Central Female College, Tuscaloosa Female College, Ursuline convent; 3 nat. banks (cap. $220,000), 1 private bank; and 3 daily and 3 weekly newspapers. Its manufactures comprise cotton and woolen goods, leather, foundry products, and boots and shoes. Tuscaloosa was the cap. of Ala. 1826-46.—Pop. (1910) 8,407.

TUSCAN ORDER: one of the five Vitruvian orders of Italian architecture, consisting of a modification of the debased Roman Doric. It is peculiar to Italy, and probably originated in Tuscany.

TUSCANY (Italian, TOSCANA), Italy: a compartimento, or territorial division, bounded by the divisions of Liguria, Emilia, Marches, Umbria and Rome, and on the w. by the Ligurian and Tyrrhenian seas. It consists of the provinces of Arezzo, Florence, Grosseto, Leghorn, Lucca, Massa e Carrara, Pisa, and Siena, with a combined area of 9,304 sq.m. A number of islands off the coast form the Tuscan Archipelago. The greater part of the surface is mountainous with some enclosed river plains in the interior at Florence and Arezzo. Along the coast are the low, marshy, and unhealthful regions of the Maremme. The principal rivers are the Arno and the Ombrone. The mineral wealth is very extensive, the chief products being iron, copper, mercury, lignite, fine Carrara marble, salt, boracic acid, and sienna earths. The soil in the valleys is fertile, producing wheat, corn, grapes, olives, tobacco, chestnuts, and flowers. The industries are very active and extremely varied. The capital is Florence, and the chief port is Leghorn. For ancient history and archæology see ETRURIA. After the fall of the Western Empire, Tus-

cany passed through various hands and was finally made a duchy under the Lombards. In the 12th and 13th centuries it was broken up into a number of small republics, among which Florence held the leading place, and later it was reunited under the dukes of Florence, the Medici. After the extinction of the Medici family it passed to the house of Lorraine, under which it remained, with an interruption at the time of Napoleon, until it was annexed by Sardinia in 1860. It then became, with Sardinia, a part of the kingdom of Italy.

TUSCARAWAS, *tŭs-ka-râ'was:* a river of northeastern Ohio; it unites with the Mohican and forms the Muskingum. It is about 126 m. long. Massillon is the chief town on the river.

TUSCARORA, *tŭs-ka-rō'ra* (sig. probably 'Indian hemp gatherers'): a tribe of the Iroquoian stock of North American Indians, which, when first known to the whites, lived on the lower Neuse river and its tributaries, the Trent and the Contentnea, the Tar and Pamlico rivers, comprising the territory s. of the present Raleigh, N. C. In 1711 they numbered about 4,000, in 15 towns. As the white settlers of North Carolina took from the Indians such lands as they needed, and as they also kidnapped young Indians for purposes of slavery in the West Indias and in the New England colonies, a large portion of the Tuscaroras, in 1711, incensed to bitter hatred toward the whites, formed with neighboring tribes a conspiracy to destroy all the settlers. The war which ensued lasted two years. On March 26, 1713, the hostile Tuscaroras were driven into a fort on Neuse river, where, after a severe conflict, they were defeated with a loss of 800 prisoners. Thus broken in power, the remnant of the hostiles migrated northward and in 1722 were adopted into the League of the Iroquois, or Five Nations, in New York, forming the Sixth Nation. In the American Revolution the Tuscaroras espoused the cause of the colonists. There are now 370 in Lewiston, New York, and 379 on the Six Nations reserve, Grand River, Canada. Neither portion retains distinctive pagan rites, and on the whole they are more progressive than their Indian neighbors.

TUSCULUM, *tŭs'kū-lŭm,* Italy: an ancient city of Latium, 15 m. s. of Rome in the Alban Hills. Tradition has it that Tusculum was founded by Telegonus, son of Odysseus and Circe. Subsequently its relations with Rome were cordial, and bestowed upon it the right of citizenship. In the Middle Ages it became the seat of a powerful family of counts. In the 12th century it was destroyed by the Romans, whereupon the inhabitants built a new town in the vicinity—Frascati. Its beautiful location attracted many wealthy Romans, who established villas in the district. Distinguished among its residents were Lucius Crassus, the orator; Pompey, Hortensius, Lucullus, Scarus, Brutus, Cæsar, and Cicero.

The *Tusculanæ Disputationes* were written here. An ancient amphitheatre, theatre, and fragments of the city walls belonging to the ancient city, have been excavated.

TUSCUMBIA, *tŭs-kŭm'bĭ-a:* city, county-seat of Colbert co., Ala.; on the Tennessee river, and on the Southern, the Northern Alabama, and the Louisville and Nashville railroads; about 174 m. n.w. of Montgomery, and 4 m. below Florence, which is on the opposite side of the river. It was settled in 1812 and was incorporated in 1818. Tuscumbia is in a beautiful valley surrounded by hilly, almost mountainous land; the soil is fertile, the rainfall medium and distributed throughout the year, and the temperature of the climate is also favorable to agriculture and fruit-raising. The chief manufactories are railroad shops, agricultural-implement works, cotton gins, and flour and feed mills. The Sheffield furnaces contribute to the prosperity of the city. The principal public buildings are the Masonic Temple, which was used in the civil war as a hospital for the wounded of both armies. There are five churches. The educational institutions are two high schools, one for white students and one for colored; Deshler Female Institute, founded in 1870; several private schools and public graded schools. There is one bank with a capital of $100,000. The government is vested in a mayor and four councilmen. Pop. 2,600.

TUSH, int. *tūsh* [imitative of a blurt with the lips: Fris. *twoy;* Dan. *twi,* interjection when one spits with disgust: Low Ger. *tuss,* hush]: an interjection to check or rebuke; a sound expressing contempt; be silent.

TUSH, n. *tŭsh* [a form of TUSK, which see]: in *OE.,* a pointed tooth; a tusk. TUSHED, a. *tŭsht,* tusked.

TUSK, n. *tŭsk* [AS. *tusc,* a grinder: Fris. *tosch,* a tooth: Gael. *tosg,* a tusk]: the long pointed tooth on each side of the upper jaw of certain animals, as the elephant and wild boar. TUSKED, a. *tŭskt,* or TUSKY, a. *tŭs'kĭ,* furnished with tusks. TUS'KER, n. *tŭs'kėr,* an elephant with full-sized tusks.

TUSKEGEE, *tŭs-kē'gē:* city, county-seat of Macon co., Ala.; on the Tuskegee railroad, a branch of the Western Railway of Alabama; 45 m. n.e. of Montgomery. It was first settled in 1780 by Indian traders, was incorporated as a borough in 1800, and as a city in 1820. It is the centre of a fertile cotton-raising region; contains a cottonseed-oil mill, two cotton ginneries, brick kilns and saw-mills; and has two banks with a combined capital of $100,000. It is also a pleasant winter resort. It is widely known as the seat of the Tuskegee Normal and Industrial Institute (q.v.), established in 1881, and is also the seat of the Alabama Conference Female College, Methodist, established in 1855. The

city government is vested in a mayor and a council of six members. Pop. 2,800.

TUSKEGEE NORMAL AND INDUSTRIAL INSTITUTE: an institution for the education of the negro, located at Tuskegee, Ala. It was established in 1881 as the Tuskegee State Normal School, receiving a state appropriation of $2,000; the first session was held in a small shanty church with one teacher; during this first session the present site, then consisting of 100 acres, was purchased through Northern aid; in 1883 the state appropriation was increased to $3,000; and in 1893 the institution was chartered under its present name. In 1899 the national government granted to the school 25,000 acres of mineral land, the proceeds from which added to the endowment fund. The aim of the school is to give its students thorough moral, literary and industrial training, thus fitting them to take active and useful part in the life of any community, and to become leaders of their own race, thereby bringing about better material and moral conditions. The organization of the Institute includes the Academic Department, the Phelps Hall Bible Training School, the Department of Mechanical Industries, and the Agricultural Department. The work of the literary and industrial departments is closely correlated, and students cannot obtain training in one line without the other. The instruction in the academic department is of elementary and secondary grade. There is also a training school including a kindergarten. The courses include English, history, geography (in elementary grades), mathematics, nature study, chemistry and physics (in the secondary grades), physiology, and Bible study; there is also a normal course, extending through the last two years, the second year's work being elective; this includes psychology, school organization and administration, history of education, and methods and teaching; practice work is provided for in the model school, and in neighboring village and rural schools. Instruction is also given in music. The Bible Training School is designed for the education of ministers and for the training of missionary workers, Sunday school teachers, etc. The course is three years in length and includes a thorough study of the Bible, Biblical theology, pastoral theology, and sociology. The instruction in the academic department is given in two sessions, the day school and the night school, the latter is intended for those who cannot afford to pay the small tuition of the day school, and pupils are allowed to work out at least all of their board for the first six months in the industrial or agricultural departments; the day school students are also given opportunity to work out a part of their board; the work must be satisfactory to be accepted. In the department of mechanical industries a large variety of trades are taught; the aim of the department is fourfold: (1) to

teach the dignity of labor; (2) to teach the trades thoroughly; (3) to furnish trained industrial leaders; (4) to assist students in paying their expenses. Instruction and work is given to the men in architectural and mechanical drawing, blacksmithing, brickmaking, carpentry, canning, electrical engineering, foundry work, harness making and carriage trimming, machinery, painting, printing, saw-milling, steam engineering, shoemaking, tinsmithing, tailoring, and wheelwrighting; to the women in plain sewing, dressmaking, millinery, cooking, general domestic science, laundering, mattress making, basketry, and nurse training. The latter is a post-graduate course, and post-graduate work is provided also in some of the other industries for both men and women. The agricultural department provides courses in general agriculture, care of animals, and dairying; there are courses for young women in poultry raising, dairying, gardening, and bee-keeping; also post-graduate courses and elementary courses compulsory for two years for students in the academic department. In 1896 the state established an agricultural experiment station in connection with the Tuskegee Institute. The land including the farm belonging to the Institute, consists of 2,631 acres; there are 62 buildings, mostly built by student labor, important among these are Porter Hall, Olivia Davidson Hall, Science Hall, Cassedy Hall, Alabama Hall, Huntington Hall, Rockefeller Hall, Collis P. Huntington Memorial Building, Phelps Hall, Bible Training School Building, Trades' Building, Dorothy Hall, and the Carnegie Library. The property is valued at $600,000; the students number 1,500; the faculty 151. In 1903 a summer school for negro teachers was established.

TUSSAC-GRASS, n. *tŭs'săk-grăs* [Gael. *dos,* a tuft; *dosach,* tufted—*lit.,* the grass that grows in tufts (see TUSSOCK)]: large, hardy, coarse, but nourishing grass (*Dactylis cæspitosa*), of the same genus with the Cock's-foot Grass of Britain, native of the Falkland Islands, remarkable for forming great tufts, sometimes 5 or 6 ft. high, the long tapering leaves hanging over in graceful curves, 5 to 8 ft. long, and an inch broad at the base. It is, however, sufficiently delicate to be very good food for horses and cattle; and, the attention of Brit. farmers having been called to it, it has been tried with much success in the Hebrides, Orkney Islands, and in several similar localities. The inner part of the stem, a little above the root, is soft, crisp, flavored like a hazelnut, and often eaten by the inhabitants of the Falkland Islands. The young shoots are boiled and eaten as asparagus.—Of the same genus is Orchard Grass (*D. glomerata*), naturalized in the United States from Europe, and cultivated because it can thrive in the shade.

TUSSAUD, *tû-sō',* MARIE GRESHOLTZ ('MADAME TUSSAUD'): founder of the well known exhibition of wax-

work in London: b. Bern, Switzerland, 1760; d. London, 1850, April 16. She learned the art of modeling in wax in Paris, where she assisted her uncle Curtius in his *Cabinet de Cire* in the Palais Royal. For a time she gave lessons in modeling to Elizabeth, sister of Louis XVI., and in this way became acquainted with the leading personages at court. In 1802 she established herself in London. The collection of over 300 portrait figures (that of Voltaire and others yet on view modeled by Madame Tussaud herself from life) with a remarkable collection of relics, is still one of the interesting features of London, where it is now managed by a company.

TUSSEH, n. *tŭs'sĕh* [native Indian name]: the silk spun by the Tusseh silkworm. The centres of the traffic are in Bengal, the central provinces, Berar, and the Nizam's country. See SILK.

TUSSER, *tŭs'ẽr,* THOMAS: English agricultural writer and poet: b. Rivenhall, near Witham, Essex, about 1524; d. London, 1580, May 3. He was a chorister at Saint Paul's and elsewhere, studied at Cambridge, was for ten years retainer and musician to Lord Paget at court, and farmed unsuccessfully in Suffolk and Norfolk. Later he was a singer in Norwich Cathedral, a tax-farmer in Essex, and a servant of Trinity Hall, Cambridge. Tusser introduced barley-culture into England, and wrote the famous work *A Hundredth Good Pointes of Husbandrie* (1557), later (1573) expanded into *Five Hundreth Pointes of Good Husbandrie.* Many proverbs have been derived from it. There have been many reprints and editions, including that for the English Dialect Society by Payne and Herrtage (1878). The rimes do not lack sound agricultural value, and Tusser has been styled the 'British Varro.'

TUSSICULAR, a. *tŭs-sĭk'ū-lẽr* [L. *tussicŭlāris,* pertaining to a cough—from *tussis,* a cough]: pertaining to, or good for, a cough.

TUSSILAGO, *tŭs-ĭ-lā'gō:* genus of plants of the nat. order *Compositæ,* sub-order *Corymbiferæ,* having bracts with a membranous edge, naked receptacle, hairy pappus; the florets of the ray pistilliferous, in many rows, tongue-shaped; those of the disk perfect, few. *T. Farfara,* sometimes called COLT'S-FOOT, the only British species, has become thoroughly naturalized in New England, N. Y., and Pa., where it is found in wet places. It has single-flowered scaly scapes, appearing before the leaves in early spring, the flowers yellow, both disk and ray; the leaves heart-shaped, angular, downy beneath. The leaves have a somewhat glutinous and subacrid taste, and are used for relief of asthmas and troublesome coughs, either in the form of a decoction, or smoked. They have been used with advantage in scrofula.—Nearly allied to tussilago is *Petasites,* of which one species, the BUTTER BUR (*P. vulgaris,* formerly

Tussilago Petasites), is a native of Britain. The leaves resemble those of *T. Farfara*, but are much larger; the flowers also appear before the leaves, but in a dense thyrsus, and are of a pale flesh-color. The flowers of both are much sought by bees, as are those of *Petasites* (formerly *Tussilago*) *alba* and *P.* (formerly *T.*) *fragrans*, natives of s. Europe.

TUSSLE, n., or TUSTLE, n. *tŭs'sl* [another form of *tousle*, to pull about roughly (see TOUSE)]: a struggle or struggling; a petty hand to hand conflict between two persons; a scuffle: V. to struggle hand to hand. TUS'SLING, imp. TUSSLED, pp. *tŭs'sld*.

TUSSOCK, n. *tŭs'sŏk* [W. *dâs*, a heap, a mow Gael, *dos*, a bush, a cluster: F. *tas*, a heap: Dan. *dusk*, a bunch, a tassel]: a clump or tuft of grass or twigs; a tall strong grass, originally from the Falkland Islands; also called TUSSAC-GRASS (q.v.). TUS'SOCKY, a. *-ĭ*, covered with or resembling tufts. TUSSOCK-MOTH, grayish-white moth (*Laria pudibunda*), about an inch long, the upper wings freckled, with four irregular darkish lines, the under wings nearly white.

TUT, int. *tŭt* [another form of *tush:* prov. Dan. *trutte*, to stick out the lips: Sw. *trut*, a snout]: an exclamation of impatience intended to check or rebuke.

TUTELAGE, n. *tū'tĕ-lāj* [L. *tutēlă*, protection—from *tutor*, a protector—from *tuĕor*, I preserve: It. *tutela;* F. *tutelle*, guardianship]: state of being under a guardian; protection; guardianship. TUTELAR, a. *tū'tĕ-lĕr*, or TU'TELARY, a. *-lĕr-ĭ*, having the charge or guardianship of (a person, a place, or a thing); protecting; guardian.

TUTENAG, or TUTENAGUE, n. *tū'tĕ-năg* [F. *toutenague:* a Pers. word]: Chinese copper, an alloyed metal of eight parts of copper, three of nickel, and six and a half of zinc; in *India*, zinc or spelter.

TUTOR, n. *tū'tĕr* [F. *tuteur*—from L. *tutor* or *tutōrem*, a watcher, a defender—from *tuĕor*, I look at, I guard: It. *tutore*]: a guardian; one who has the care of a minor; one who has the care of the education of another; a private instructor; in *universities* and *colleges*, one who superintends the studies of students or undergraduates: V. to teach; to instruct; to correct. TU'TORING, imp.: N. the act of instructing; education. TU'TORED, pp. *-tĕrd*. TU'TORESS, n. *-ĕs*, a woman who instructs privately. TU'TORSHIP, n. *-shĭp*, the office of tutor. TU'TORAGE, n. *-tĕr-āj*, education, as by a tutor; guardianship. TU'TORISM, n. *-izm*, tutorship. TUTORIAL, a. *tū-tō'rĭ-ăl*, pertaining to a tutor or instructor; exercised by a tutor. TUTO'RIALLY, ad. *-lĭ*.

TUTTY, n. *tŭt'tĭ* [F. *tutie;* Port. *tutia;* It. *tuzia*—from Ar. *toutiyâ*]: impure protoxide of zinc collected from the chimneys of smelting-furnaces.

TUTUILA, *tû-tû-ē'la:* island in the Pacific, belonging to the Navigators' or Samoan group (see SAMOA); about 17 m. long and 5 m. broad. The coast is bold, and the island is traversed by sharp-peaked, highly picturesque mountains, 2,500 to 3,500 ft. high. The harbor of Pago Pago, an ancient crater, is very deep, and completely landlocked by lofty mountains. In 1872 the chief of this part of Tutuila ceded to the United States the use of this harbor as a naval and coaling station. This cession was confirmed, by treaty, 1878; the United States came into possession of Tutuila in 1900. The mountains are clothed with dense green forests. Between the months of November and May, fearful hurricanes break over the island, and so powerful is their effect that they are said by the natives to *skin the land.* See SAMOA; APIA.

TUWHIT, n. *tū-hwĭt',* or TUWHOO, n. *tū-hwô':* a word imitative of the cry of the owl.

TUYERE, n. *tô-yār'* or *twē'ār* [F. *tuyère,* opening of a furnace; *tuyau,* a pipe, a tube: OHG. *tuda,* a tube]: *formerly,* the point or nozzle of the blast-pipe that enters the side of a smelting-furnace and through which the air is forced; also the aperture in the side where the nozzle enters; a name now applied to the blast-pipe, of which there may be two or five.

TVASHTRI, or TVASHTAR: in the Rigveda of the Hindus, the mythological creator, shaper, or divine artisan, later classed among the Adityas or gods of heavenly light. He is the divinity who creates the gods, human-kind, and animals, and rules their destinies. His daughter Saranyu, whom he married to Vivasant, was the mother of Yama and Yami, the primeval pair. The sun as the primary source of life and all blessings is supposed to be the mythological origin of Tvashtri.

TVER, *tvār,* Russia: (1) capital of the government of that name, on the Volga, 96 miles northwest of Moscow. It contains a Kremlin or fortress, surrounded by a wall, outside of the main town, has fine promenades, spacious open squares, handsome buildings, royal palace, 34 churches, two monasteries, convent, Protestant and Catholic churches, etc. The cathedral of the Transfiguration is a remarkable structure with five cupolas, and fine mural paintings by Platon (18th century). Further a monument to Catharine II., theatre, various schools, seminaries and military academy. There are numerous manufactories, including cotton mills, iron-foundries, starch factories, etc. A brisk trade is carried on with Moscow and Saint Petersburg. There are spacious docks and machine-shops. Pop. 53,477. (2) The government contains an area of 25,794 square miles. The surface is mountainous, declining into a plain at the north. Forests are extensive and the fields yield rye, barley, hemp and flax. Pop. 1,812,825.

TWADDLE, v. *twŏd'dl*, or TWATTLE, v. *twŏt'tl* [Swiss, *watteln*, to dabble in the wet: Icel. *thwætta;* Norw. *twætta*, to jabber, to talk nonsense: Bav. *schwatteln*, to splash, to chatter]: to talk foolishly; to chatter; to talk in a trifling manner: N. foolish or trifling talk; a twaddler. TWAD'DLING, imp. *-dlĭng:* N. empty gossip. TWADDLED, pp. *twŏd'dld*. TWAD'DLER, n. *-dlĕr*, one who talks in a silly manner. TWAD'DLY, a. *-dlĭ*, gossiping; twaddling.

TWADDLE, n. *twŏd'dl* [name of its inventor]: a scale used in the chemical trade to denote the strength of various solutions, especially the percentage of acid contained.

TWAIN, a. or n. *twān* [see TWO]: two.

TWAIN, MARK: see CLEMENS, SAMUEL LANGHORNE.

TWANG, v. *twăng* [imitative of a resonant sound: see also TANG 1]: to sound with a quick sharp noise, as a tense string pulled and allowed to spring back suddenly: N. the sound of a tense string pulled and suddenly set free; a nasal tone of voice; a disagreeable resonance in a voice from speaking through the nose; a disagreeable flavor. TWANG'ING, imp.: ADJ. contemptibly noisy. TWANGED, pp. *twăngd*. TWANGLE, v. *twăng'gl*, in *OE.*, to twang. TWANK, v. n. *twăngk*, same as *twang*.

'TWAS, *twŏz:* a contracted form of *it was*.

TWATTLE, v. *twŏt'tl:* same as TWADDLE (q.v.).

TWAY-BLADE, n. *twā'blād:* a kind of orchis with two large leaves; *Listĕra ovāta*, ord. *Orchidācĕæ*.

TWEAK, v. *twēk* [a form of TWITCH (q.v.)]: to pinch or pull with a sudden jerk and twist, as the nose: N. a sharp pinch or jerk. TWEAK'ING, imp. TWEAKED, pp. *twēkt*.

TWEED, *twēd:* famous Scottish river, rising in s. Peeblesshire, 1,500 ft. above sea-level; flowing n.e. to Peebles, thence e.-by-s. to its junction with the Ettrick, and thence e. and finally n.e. to the North Sea at Berwick-on-Tweed. The river drains great part of Peeblesshire, traverses the n. districts of Selkirk and Roxburgh shires, and forms in its lower course the boundary between Berwickshire on the n.w. and the English border-land on the s.e. It receives the Ettrick, the Teviot, and the Till from the s.; and the Gala, Leader, and Adder from the n. The T. passes Peebles, Innerleithen, Melrose, Dryburgh Abbey, Kelso, Coldstream, and Berwick, a course of 96 m. (the last 2 m. in England), draining an area estimated at 1,870 sq. m. The T. is tidal as far as Norham Castle, 10 m. from its mouth; but there is little or no navigation above Berwick. The region through which the river flows is singularly picturesque and beautiful, especially in its middle and lower course. Possibly the T. owes its fame more to its historic associations than to the charms of the scenery through which it flows. Traversing the heart of the 'Borders,' it has witnessed many a foray between the warrior-farmers north and south, as well as many a deadly struggle between the rival houses of s. Scotland; and its name is frequent in ballad and story. The T. is famous as a salmon and trout stream.

TWEED, kind of woolen cloth largely made at Galashiels, Hawick, Selkirk, and other places in s. Scotland; hence called *Scotch T.*, to distinguish it from similar fabrics made elsewhere. This kind of cloth was at first known as *tweel* (twill), so called from being woven diagonally; but owing to an accidental misreading of an invoice, *tweel* was superseded by the popular and appropriate name *tweed*. It is of open, soft, flexible texture; differing from English superfine cloth in being less finely spun and less closely woven, but chiefly in not being so thoroughly felted. The manufacture of T. is of comparatively recent date. At the beginning of the 19th c., the weavers of Galashiels, then a mere village, produced, as they had done for more than 200 years, a kind of coarse woolen cloth known as 'Galashiels grays,' made from wool grown on the surrounding hills. Between 1820 and 30 a beginning was made in the manufacture of woolen cloth of the 'shepherd's check' pattern, which fabric, partly through the patronage of Sir Walter Scott and many of his contemporaries, at once became popular under its new name of T. The warmth, comfort, and durability of tweeds, and their suitability for all seasons, gradually led to their being preferred to the hard tartans, Manchester linens, and nankeens of former days, and eventually even to doeskins. The demand rapidly increased, and Galashiels, with 600 inhabitants in 1778, had over 15,000 in 1881. Hawick, Selkirk, and other neighboring places have shared in this prosperity in corresponding degree. Nor has the manufacture confined itself to Tweedside: it has spread n. to Aberdeen, Elgin, and Inverness; s. to Dumfries and into Cumberland; and w. to Stirlingshire and Ayrshire, and even to the Hebrides. The wools used in s. Scotland are chiefly those imported from Australia and the Cape of Good Hope; in other districts, Cheviot, Danish, and other wools also are used. The manufacture of T. is now one of the chief staples of Scotland, its success being due in great measure to the sound quality of the raw material used, as well as to the good taste and practical knowledge of the makers. In 1862 the total annual value of the tweeds made in Scotland was estimated at about $8,000,000. In 1881 it was estimated that the manufactories were capable of turning out tweeds to the annual value of about $27,000,000. About half this sum would represent the value of the wool used.

TWEED, William Marcy: politician: 1823, Apr. 3—1878, Apr. 12; b. New York. He learned the trade of chair-making, and worked at it a few years. Having organized the Americus Fire Co. (in the old volunteer fire dept. of the city), of which he was chosen foreman, he acquired great popularity and had much influence in local politics. He was elected a New York alderman 1852, representative in congress 1853, chairman of the board of supervisors 1856, school commissioner 1856–7, deputy street commissioner 1861–70, state senator 1867. He became commissioner of public works 1870, and while in that office organized the 'ring' or combination of municipal officials famed as the Tweed Ring. The city

treasury was defrauded of many millions of dollars by means of fraudulent vouchers, double and triple payments for the same work, and by similar practices. The guilt of T. and his associates was proved by documentary evidence secured by the *New York Times*. He was held in $1,000,000 bail in a civil suit brought on behalf of the city 1871, Oct., and was arrested on charge of criminal fraud Dec. He was found guilty on the criminal charge 1873, Nov., and was sentenced to 12 years' imprisonment. Judgment was rendered in the civil suit 1875, Apr., for $6,000,000 with interest. T. escaped from prison 1875 Dec., and fled to Spain, but was extradited. He died a prisoner.

TWEEDLE, v. *twē'dl* [a form of TWIDDLE]: to touch or handle lightly; to twiddle; to wheedle. TWEE'DLING, imp. TWEE'DLED, pp.

TWEEDLEDUM AND TWEEDLEDEE, *twē'dl-dŭm, twē'dl-dē:* a familiar phrase, denoting a distinction without a difference; an attempt to distinguish between things or parts where no difference exists; hair-splitting nonsense.

TWEED'MOUTH: see BERWICK-ON-TWEED.

TWEEL, v. n. *twēl:* same as TWILL (q.v.). TWEEL'ING, imp. TWEELED, pp. *twēld.*

'TWEEN: a contr. of *between*.

TWEER, n. *twē'ėr:* another spelling of TUYERE.

TWEESE, or TWEEZE, n. *twēz* [see *note* under TWEEZERS]: a case of surgical instruments.

TWEEZERS, n. plu. *twē'zėrz* [from the numeral *two:* Swiss, *zwiser*, a forked twig: Swab. *zwisele*, a forked stem]: an instr. consisting of two pointed branches for taking hold of small objects; small nippers or pincers used for plucking out hairs. *Note.*—According to another etymology, *tweezer* is properly an instr. contained in a *tweese* or case of instruments; *tweeze* is a corruption of OF. *estuy;* F. *étui*, a case for instruments, the same word as Sp. *estuche*, a scissors-case, Port. *estojo*, a tweezer-case.

TWELFTH-DAY: see BEAN-KING'S FESTIVAL: EPIPHANY.

TWELVE, n. a. *twĕlv* [AS. *twelf*, twelve: Goth. *twalif*, twelve—from *twai*, two; *laibos*, relics: Lith. *dwilika*, twelve—from *dwi*, two; *likti*, to remain over: the idea being the second excess above ten—see *note* under ELEVEN]: the first number after eleven; the sum of two and ten; a dozen. TWELFTH, a. *twĕlfth*, the ordinal of twelve; next in order after the eleventh: N. one part of twelve; in *music*, an interval of an octave and a fifth. TWELVEMONTH, n. a year. TWELVEMO or TWELVES: see under PAPER. TWELFTH-CAKE, a sweet ornamental cake given to friends or visitors on Twelfth-night, 6th January. TWELFTH-DAY, or -TIDE, the twelfth day after Christmas; the festival of the Epiphany (q.v.), or manifestation of Christ to the Gentiles (see BEAN-KING'S FESTIVAL). TWELVEPENCE, n. *-pĕns*, a shilling.

TWELVE APOSTLES, TEACHING OF THE: see TEACHING OF THE TWELVE APOSTLES.

TWELVE TABLES (L. *Lex* or *Leges Duodecim Tabularum*): the earliest code of Roman law; so called because cut on 12 bronze tablets. According to the ancient account, the code originated B.C. 462, in the proposal of a tribune, C. Terentilius Arsa, for the appointment of five men to draw up a set of laws to limit the *Imperium* (q.v.), of the consuls. After several years of resistance and delay, the senate dispatched, B.C. 454, three commissioners to Greece and the Greek colonies in s. Italy, to report on the laws in force there. After two years they returned; and ten men (*decemviri*) were appointed, with consular power, and under the presidency of Appius Claudius (q.v.), to draw up a code (*legibus scribundis*). In B.C. 451 the code was finished, was passed into law by the Comitia (q.v.) of the centuries, engraved on ten tables of wood, and set up in the Forum. In the following year, the decemvirate having been reappointed, two other tables of supplementary matter were added: see DECEMVIR. Some provisions of the T. T. correspond to laws observed in Greece, and several are almost literal renderings of parts of the laws of Solon (q.v.). This has led some to regard the T. T. as an eclectic assortment of foreign laws; but modern investigators are now agreed that they are in the main native and original, and express the first effort in the way of codifying the consuetudinary laws of the Latin race.

According to Livy (iii. 57) and Diodorus (xii. 56), the laws of the T. T. were cut on bronze tablets and put up in a public place. Whether these tablets were destroyed by the Gauls when they sacked and burned Rome B.C. 390 is uncertain. But the later Romans entertained no doubt that the collection which existed in their time was genuine; and Cicero tells us that in his youth school-children were required to commit them to memory. The only portions extant are those which have been quoted by jurists and others. The T. T. are described by Livy (iii. 34) as the *fons publici privatique juris*—the fountain of public and private law; and Cicero (*De Or.*, I. 43, 44) speaks of them with high praise. In the course of years, the *Jus Publicum*, as could not fail to be the case, was greatly changed; but the *Jus Privatum* of the T. T. continued to be the fundamental law of the Roman state. See article 'Lex,' in Smith's *Dic. of Gr. and Rom. Ant.;* Niebuhr's *Lect. Rom. Hist.* (Eng. transl., I. 295–319); Mommsen's *Hist. of Rome;* and the relevant portions of Ihne's and Duruy's histories. The work of Dirksen (*Uebersicht der bisherigen Versuche*, etc.) on the subject and his ed. of the fragments (1824) deserve notice; also the edition by Schöll (1866), and that by Bruns in *Fontes Juris Romani* (3d ed. 1876).

TWENTY, n. a. *twĕn'tĭ* [Ger. *zwanzig;* Icel. *tuttugu*, twenty: Goth. *tvaitigjus*, twenty—from *tvai*, two; *tigjus*, the sum or number of ten: AS. *twentig*, twenty (see EIGHTY, under EIGHT)]: one more than nineteen; a score; a proverbial or an indefinite number. TWEN'TIETH, a. *-ĕth*, the ordinal of twenty: N. one of twenty equal parts. TWENTY-FOLD, a. twenty times as many or as much. TWENTY-FOURMO, or TWENTY-FOURS: see under PAPER.

TWIBILL, or TWYBILL, n. *twī'bĭl* [from *two*, and *bill* 1]: in *prov.* and *OE.*, a two-edged bill or mattock.

TWICE, ad. *twīs* [OE. *twies*—from *two:* AS. *twiwa*, twice]: two times; once and again; doubly.

TWICKENHAM, *twĭk'ĕn-am:* town in Middlesex co., England; on the n. bank of the Thames, and on the London and Southwestern railway; 11¼ m. s.w. of London. It is opposite Richmond, and connected with it by a stone bridge. It contains a free library, a museum, a school for the daughters of naval and marine officers, and several charitable institutions. T. is noted for the beauty of its suburban residences and for its famous old historical buildings, among which are Strawberry Hill, the residence of Horace Walpole, and York House, the residence of James II. when Duke of York. It was the home of Pope, who is buried here.—Pop. 21,000.

TWIDDLE, v. *twĭd'dl* [a word imitative of a quivering motion]: to touch lightly; to play with a tremulous quivering motion; to twirl: N. a twist of the fingers. TWID'DLING, imp. *-dlĭng.* TWIDDLED, pp. *twĭd'dld.*

TWIFOLD, or TWYFOLD: OE. for TWOFOLD.

TWIG, n. *twĭg* [Low Ger. *twieg;* Ger. *zweig*, a twig—from *zwei*, two: Dan. *tvege*, a forked branch]: a small shoot or branch of a tree or bush. TWIG'GY, a. *-gĭ*, full of twigs; abounding with shoots. TWIG'GEN, a. *-gĕn*, made of, or cased in, twigs.

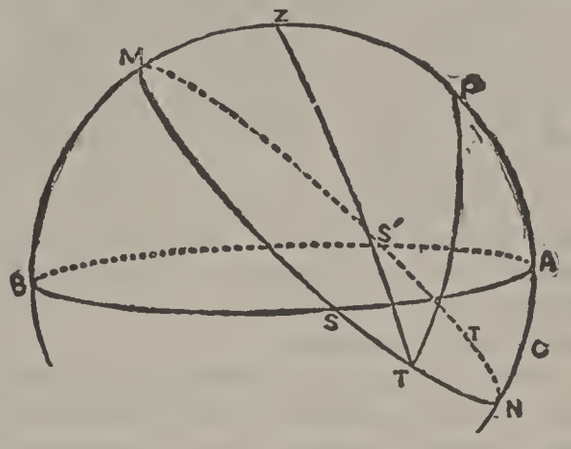
TWIG, v. *twĭg* [Gael. *tuig*, to understand, to discern]: in *old* and *familiar Eng.*, to understand, as a person's motives and meaning; to comprehend; to watch; to observe; to notice. TWIG'GING, imp. TWIGGED, pp. *twĭgd.*

TWIGGS, *twĭgz*, DAVID EMANUEL: soldier: 1790–1862, Sep. 15; b. Richmond co., Ga. He served in the war of 1812; he had attained the rank of brig.gen. in the U. S. army 1846; won high distinction at the battles of Palo Alto and Resaca de la Palma in the Mexican war, in both of which actions he commanded the right wing; for gallantry at Monterey he was brevetted maj.gen. 1848, and presented by congress with a sword. He adhered to the southern Confederacy in the civil war, at the outbreak of which he surrendered to the state of Texas Federal war material and troops that were under his command. He was appointed maj.gen. in the Confederate army 1861, May, but resigned before the end of the year.

TWILIGHT, n. *twī'līt* [AS. *tweon-leoht*, twilight—from *tweon*, doubt, hovering between two things—from *twi*, double; *leoht*, light (see LIGHT)]: the faint light perceived before sunrise and after sunset; uncertain view; obscure light: ADJ. faint; obscure; deeply shaded; imperfectly illuminated.

TWI'LIGHT: light from the sky which is perceived during the transition from night to day (usually called 'dawn'), but specifically from day to night, the length of the transition period varying with the latitude of the place and the declination of the sun. If the earth had no

atmosphere, we should be in total darkness from the instant of sunset until the instant of sunrise. T. is simply sunlight reflected by the air and the clouds and dust and vapors suspended in it, the sun being not more than 18° below the horizon. The question of the duration of T. is, therefore, simply reduced to this: How long after sunset does the sun reach a position 18° below the horizon of a given place? And this can be answered by calculation in spherical trigonometry. Thus, if Z be the zenith, P the



pole of the heavens, ASB the horizon, and MSTN the (small) circle which the sun describes about the pole, there is twilight while the sun moves from T to S, ZT being an arc of 108°. In the spherical triangle ZPT, we know the three sides, for ZP is the co-latitude (or complement of the latitude, or the difference between the latitude expressed in degrees, and 90°) of the place, PT the sun's polar distance, and ZT is 108°. Hence we can calculate the angle ZPT, which is the sun's *hour-angle;* and from this we find how long before or after noon the sun passes the point T. If ZT′ be also 108°, we see that it is night while the sun moves from T′ to T, day while it moves from S (through M, its meridian position) to S′, morning twilight or 'dawn' from T to S, and evening twilight from S′ to T′. Make ZC = 108°, then, if PN be less than PC, but greater than PA, there will be no point of the sun's path (MS′NS) so far as 108° from Z; therefore the points T and T′ will not exist. In this case the sun will set and rise, but there will be *no night*, or, rather, twilight will occupy the whole interval from sunset to sunrise. This cannot occur in low latitudes, but does occur during certain periods of the year in extreme n. and s. countries. For

PN is 90° — sun's declination,
PC is latitude + 18°,

and our condition is, therefore, that 90° — sun's declination, while greater than the latitude, does not exceed it by more than 18°. Or, in a simpler form, the latitude, together with the sun's declination, must lie between 90° and 72°. Now, the sun's greatest declination is about 23° 30′; therefore, in lat. 48° 30′ (72° — 23° 30′) there will be one night in the year (at the summer solstice) consisting wholly of twilight; for higher latitudes, more; and for lower, none.

Some curious problems on this subject, such as the finding the time of year at which the twilight is longest in a given latitude, were among the early triumphs of the differential calculus.—A curious phenomenon, the *afterglow*, or second twilight, often seen in the Nubian desert, is referred by Sir John Herschel to a *second* reflection of solar light in the atmosphere. Lambert and others had previously speculated on the possibility of second and even third twilights, but in their time there was no record of such appearances.

TWILL, v. *twĭl*, or TWEEL, v. *twēl* [Ger. *zwillich*, ticking: Low Ger. *twillen*, to make double—from the root of *two*, which see]: to weave cloth so as to produce the appearance of diagonal lines or ribs on its surface: N. cloth having a kind of diagonal ribbed appearance on the surface, produced in weaving by passing the weft over one and under two or more warp-threads. Twills are called *three-leaf twill*, *six-leaf twill*, etc., according to the number of heddles used. TWILL'ING, imp. TWILLED, pp. *twĭld:* ADJ. woven in such a manner as to produce the appearance of diagonal ribs on the surface.

TWIN, n. *twĭn*, generally used in plural TWINS, *twĭnz* [Ger. *zwilling;* OHG. *zwinilinc*, twin: Lith. *dwyni*, twins: comp. L. *bini*, two at a time—from *bis*, twice]: one of two young produced at a birth by an animal that usually brings forth only one; one very much resembling another: in *mineral.*, one of two crystals so joined that by revolving 180° round a common axis one would come into the space occupied by the other (see TWINNING): V. in *OE.*, to be born at the same birth; to be paired; to bring forth twins: ADJ. denoting one of two produced at a birth; very much resembling. TWINNED, a. *twĭnd*, in *OE.*, born at the same birth; like as twins; paired. TWIN'LING, n. *-lĭng*, a twin lamb. TWIN-BORN, produced at the same birth. TWIN-BROTHER, a brother being one of two (either both male, or one male and the other female) produced at the same birth. TWIN-FLOWER, an elegant little creeping evergreen plant; *Linnæa borealis*, ord. *Caprifoliăcĕæ*. TWIN-LIKENESS, near resemblance. THE TWINS, a sign of the zodiac; Gemini.

TWINE, v. *twīn* [Dut. *twijn;* Icel. *tvinni*, twine: Icel. *tvinna;* Dan. *tvinde*, to twine, to double]: to twist; to wind around another, as a thread or cord; to wind or twist anything flexible around something else; to unite closely, as by twisting; to embrace; wreathe; coil; wind: N. a strong thread composed of two or three smaller threads twisted together; cord; a twist; an embrace. TWIN'ING, imp.: ADJ. ascending spirally around a stem, a branch, or a prop; uniting closely to; embracing. TWINED, pp. *twīnd.*

TWINGE, v. *twĭnj* [a nasalized form of TWITCH, which see: Sw. *tvinga*, to restrain: Dut. *dwingen;* Ger. *zwingen*, to constrain]: to affect with a sharp, sudden, passing pain; to pinch; to be affected with sharp sudden pains of short duration: N. a sudden, sharp, passing pain; a pinch; a sudden rebuke, as of conscience. TWING'ING, imp.: N. the act of pinching with a sudden twitch; a sharp passing pain. TWINGED, pp. *twĭnjd.*

TWINK, v. n. See TWINKLE.

TWINKLE, v. *twĭng'kl,* or TWINK, v. *twĭngk* [AS. *twinclian,* to twinkle, a nasalized form from *twiccan,* to twitch, expressive of continued twitching or quivering, hence to twinkle (see TWITCH): Swiss, *zwyggen,* to twitter; *zwinken,* to wink, to twinkle]: to flash or sparkle at short intervals; to shine with a tremulous or quivering light; to sparkle; to open and shut the eye by turns: N. a shining with a tremulous or quivering light; a motion of the eye; a wink; the time occupied by a motion of the eye; an instant. TWIN'KLING, imp. *-klĭng:* ADJ. shining with a twinkle: N. a scintillation; a flash; a very short time; a moment; an instant. TWINKLED, pp. *twĭng'kld.*

TWINNING, n. *twĭn'ĭng:* in *mineral.,* a form of irregular crystallization in which two or more crystals or parts of crystals are united, but in reversed positions to one another, into one group or compound crystal, by contact or apposition (as in spine), by intersection (as in staurolite), by penetration (as in calcite), or by incorporation (as in quartz).

TWIRE, v. *twīr* [Gael. *tuir,* to chant, to sing: F. *tirelire,* expressive of the singing of the lark: Bav. *zwiren,* to spy]: in *OE.,* primarily 'to sing,' then 'to peep, to look in furtively;' to chirp; to twitter; to twinkle; to be in a kind of flutter; to leer; to simper. TWIR'ING, imp. TWIRED, pp. *twīrd.*

TWIRL, v. *twėrl* [MHG. *twirel,* that which turns rapidly round: Dut. *dwarlen,* to whirl: Swiss, *zwirlen,* to twirl: Bav. *zweren,* to stir; *zwirel,* a stirrer]: to turn round rapidly; to whirl; to cause to rotate with rapidity, particularly with the fingers; to twist: N. a rapid circular motion; quick rotation; twist. TWIRL'ING, imp.: N. act of that which twirls; a rapid circular motion. TWIRLED, pp. *twėrld.*

TWISS, SIR TRAVERS: English jurist: b. London 1809, Mar. 19; d. 1897, Jan. 15. He was graduated at Oxford, and from 1842 to 1847 was afterward professor of political economy there. In 1852-5 he occupied the chair of international law at King's College, London, and in 1855-70 was regius professor of civil law at Oxford. In 1862 he was made advocate-general of the British admiralty, and in 1867 was knighted and appointed advocate-general to the queen. In 1872 he retired from public office, but was occupied with various state affairs, notably with the drafting of a constitution for the Kongo Free State, for the Belgian government, and in 1884-5 was counsel extraordinary to the British embassy at the Congress of Berlin. His published works include: *The Oregon Territory: Its History and Discovery* (1846); *View of the Progress of Political Economy in Europe Since the Sixteenth Century* (1847); *The Law of Nations* (1861-3); *Monumenta Juridica: The Black*

Book of the Admiralty (1871-6); and *Belligerent Rights on the High Seas* (1884).

TWIST, v. *twĭst* [AS. *twi,* double: Dut. *twisten,* to double or unite two threads, to quarrel: Dut. *twist;* Ger. *zwist,* a twist, discord, quarrel]: to unite by winding one thread or other flexible substance round another; to form by winding separate things round each other; to encircle; to turn from a straight line; to contort; to be united by winding round each other; to pervert: N. manner of twisting; a cord, thread, or the like, formed by winding separate parts round each other; a contortion; silk in hanks, balls, or reels, for sewing; a kind of tobacco manufactured in twist form; a bending from a straight line; an obliquity or peculiarity in intellect or disposition. TWIST'ING, imp.: ADJ. forming convolutions; becoming contorted: N. convolution; contortion. TWIST'INGLY, ad. TWIST'ED, pp.: ADJ. formed by winding threads or strands round each other. TWIST'ER, n. one who or that which twists; a rope or twine maker.

TWIT, v. *twĭt* [AS. *ætwitan,* to reproach—from *æt,* at; *witan,* to blame: Icel. *vita,* to reprove, to fine]: to vex or annoy by bringing to remembrance a fault, imperfection, or the like; to upbraid; to taunt. TWIT'TING, imp. TWIT'TED, pp. TWIT'TINGLY, ad. *-lĭ,* with reproach; upbraidingly. TWIT'TER, n. *-tėr,* one who twits.

TWITCH, v. *twĭch* [Ger. *zwicken,* to pluck, to pinch; *zwick,* a pinch: Low Ger. *twikken,* to twitch, to pluck]: to pull with a sudden jerk; to snatch: N. a pull with a sudden jerk; a spasmodic contraction of the muscles, of extremely short duration; a place in a mine where the vein diminishes and almost disappears. TWITCH'ING, imp.: ADJ. pulling with a jerk; suffering short spasmodic contractions: N. the act of pulling with a jerk; the act of suffering short spasmodic contractions; a twitch. TWITCHED, pp. *twĭcht.* TWITCH'ER, n. *-ėr,* one who or that which twitches. TWITCH-GRASS [a. form of *quitch*—from *quick,* in the sense of living (see COUCH GRASS)]: a species of grass difficult to root out and destroy; couch-grass; *Tritĭcum repens,* ord. *Graminĕæ.*

TWITE, n. *twīt* [imitative of its cry]: the mountain-linnet.

TWITTER, v. *twĭt'tėr* [imitative of sharp broken sounds like the notes of a little bird: Ger. *zwitschern,* to twitter: Swiss, *zwitzern,* to flicker: Bav. *zwitzern,* to gnash the teeth, to tremble: Dut. *kwetteren,* to twitter, chatter]: to make a succession of small tremulous sounds like a swallow or other small bird; to feel a slight trembling of the nerves; in *OE.,* to titter: N. a small tremulous noise, as of a swallow; a slight trembling of the nerves; in *OE.,* a titter. TWIT'TERING, imp.: N. the act of uttering a succession of small sounds. TWIT'TERED, pp. *-tėrd.*

'TWIXT, *twĭkst:* a contracted form of BETWIXT.

TWO, a. and n. *tô* [AS. *twa;* Ger. *zwei;* Dan. *to;* Dut. *twee;* Goth. *twai;* Ir. and Gael. *da;* Gr. and L. *duo;* Russ. *dwa;* Skr. *dvau,* two]: one and one; the number after one. TWO-EDGED, a. having edges on both sides, as a sword. TWO-FACED, having a face both in front and behind, as the Roman god Janus (q.v.); hence, insincere; given to double-dealing. TWOFOLD, a. two of the same kind: duplicate; pertaining to two different things existing together: AD. in a double degree. TWO-FOOT, a. that can measure two feet. TWO-HANDED, a. requiring two hands to grasp, as a sword; stout and strong; large; dexterous. TWO-MASTED, a. having two masts, as a ship. TWOPENNY, a. *tŭp'pĕn-nĭ,* of the value of *twopence.* TWOPENCE, n. *tŏ'pĕns* or *tŭp'pĕns,* sum amounting to two pennies. TWO-PLY, a. consisting of two thicknesses; consisting of two strands twisted together, as thread. TWO-TONGUED, a. double-tongued; deceitful.

TWO-PHASE SYSTEM: an alternating-current system employing two alternating currents, of equal strength, differing in phase by a quarter cycle, or such that one current has maximum strength when the other is passing through zero. TWO-WIRE SYSTEM: in electric distribution, the system which provides two main conductors, between which lamps, motors, or translating devices are connected in parallel.

TWO-THIRDS RULE.

TWO-THIRDS RULE: a provision of constitutional and parliamentary law intended to restrain and prevent unjust and inconsiderate action on the part of majorities. It was unknown in the legislative assemblies of ancient Greece and Rome, and has no precedent in the parliamentary history of Great Britain. It may be regarded as American in its origin, and grew out of the jealous vigilance with which the smaller communities included in the Union of States sought to safeguard their political rights. The Constitution of the United States, in conferring on the Senate the power to try impeachments, provided that no conviction should be had by less than a two-thirds vote, thus securing to a minority of the States as represented in the Senate, the power to decide the result. The effect of the two-thirds provision, in the case of President Andrew Johnson, when tried on articles of impeachment, was to prevent his conviction, the vote being 35 senators for conviction and 19 for acquittal. A change of one vote would have carried conviction, and although public feeling ran high at the time, some senators who voted against the President expressed themselves in subsequent years as gratified with the result. In this case the two-thirds rule had exactly the effect intended by the framers of the Constitution. A similar rule regarding trials on impeachment has been adopted in State constitutions. The Constitution of the United States also provides that in the event of a veto by the President of any measure which has passed Congress, an affirmative vote of two-thirds shall be necessary to enact the measure into law, and such vote must be taken by yeas and nays, and the names of the persons voting entered on the journal of each house respectively. This rule has also been adopted in the States in which governors possess the power of veto.

The two-thirds rule is best known because of its use by Democratic National Conventions in making nominations for the presidency and vice-presidency of the U. S. This was first used in 1832, but applied to the nominee for vice-president only, as there was no contest over the presidential nominee, Jackson being practically the unanimous choice. The rule was not again used until 1844, when it was applied to both offices, since when it has not been disputed, although in 1904 an earnest effort was made to have it abrogated. The enforcement of the rule in the convention of 1860 may be said to have been one of the more or less remote causes of the outbreak of the Civil war in 1861, for it is evident that had Douglas, who had a majority vote, received the nomination at the first assembling of the convention in Charleston and received the united support of his party, he would have been elected and the conflict prevented, or at least postponed. In the ensuing election Lincoln received but 1,866,152 votes, while the aggregate vote for the various Democratic candidates was 2,223,110.

TWYBILL. See TWIBILL.

TWYER, n. *twī'ėr:* same as TUYERE.

TYAN-SHAN, *tē-ân'shân'*, THIAN-SHAN, or CELESTIAL MOUNTAINS: Central Asia, a range of mountains running in an easterly direction from the Pamir plateau along the northern boundary of the Tarim basin (East Turkestan) into southern Mongolia. In the east it forms a more or less connected ridge, but toward its western extremity it spreads out, fan-like, into a number of diverging ranges. The highest point, situated near the western end, is Tengri Khan, with an altitude of little over 24,000 feet. See HIMALAYA.

TYBEE: an island in Chatham co., Ga.; at the mouth of the Savannah River. It is about 6 m. long and 3 m. wide. The waters surrounding it are on the n. Tybee Roads, on the e. the Atlantic, on the s. Tybee Creek, and on the w. Lazaretto Creek. The Tybee lighthouse is on the n.e. end; it is 134 ft. high; the white dioptric light is 150 ft. above the water, and is visible 18 nautical m. The lighthouse is in lat. 32° 1′ 20″ N., lon. 80° 50′ 31″ W. In the Civil war of 1861-2 it was occupied by the United States forces, under command of Brigadier-General Sherman, 1861, Nov. 28, and batteries were subsequently erected on it and the adjacent islands for the reduction of Fort Pulaski at the mouth of the Savannah River, commanded by Colonel Olmstead of the Confederate army. The bombardment began on the morning of 1862, April 10, from 11 batteries, between 1,500 and 3,000 yards from the fort, mounting 20 guns and 16 mortars; and the fort capitulated at 2 o'clock the next afternoon.

TYBURN, *tī'bėrn:* chief place of execution of the death-sentence in London prior to 1783; near the n.e. corner of Hyde Park, w. extremity of Oxford street, where Edgeware and Uxbridge roads unite. Tyburn took its name from a small stream which ran from Hampstead to the Thames through St. James's Park, but which long ago disappeared. The gallows seems to have been a permanent erection, resting on three posts, whence the phrase 'Tyburn's triple tree.' Wooden galleries were erected near for accommodation of spectators. The criminal was conveyed from Newgate to Tyburn, about 2 m., by Holborn and the Tyburn road, now Oxford street, but in the 17th c. a 'sloughy country road.' As London spread westward, the long procession became inconvenient, and the place of execution was, 1783, Dec. 9, removed to the Old Bailey, or Newgate, where it continued till the close of 1884.

In early times the frequency of executions rendered the office of executioner more important than it is now. During the reign of Henry VIII. (38 years) the average number of executions in England was 2,000 per annum. In the 19th c. the number has sunk to about 12. The

first executioner of whom we have record was 'one Bull,' 1593. He was succeeded by Derrick, referred to in the *Fortunes of Nigel*, and mentioned in a political broadside as living in 1647. In the ballad of *The Penitent Tailor*, published in the same year, reference is made to his successor, Gregory Brandon—

> 'I had been better to have lived in beggary,
> Than to have fallen into the hands of Gregory.'

In Gregory's time it was the custom to prefix 'squire' to the names of the Tyburn hangmen. This is said to have originated in a practical joke played on the garter king-of-arms. He was induced to certify the authenticity of a coat-of-arms of a gentleman named Gregory Brandon, supposed to reside in Spain, but who turned out to be the 'hangman.' The garter king was sent to prison for his negligence; hence the popular error that 'an executioner who has beheaded a state prisoner becomes an esquire.' Gregory was succeeded by his son Richard. 'Squire Dun' followed; and after him came Jack Ketch, or Squire Ketch, mentioned first 1678. It was he who beheaded Lord Russell and the Duke of Monmouth. Lord Macaulay, in speaking of the latter execution, says: 'He then accosted Jack Ketch, the executioner, a wretch whose name has, during a century and a half, been vulgarly given to all who have succeeded him in his odious office. "Here," said the duke, "are six guineas for you. Do not hack me, as you did my Lord Russell. I have heard that you struck him three or four times. My servant will give you some gold if you do the work well."' (*History of England*, II. 205.) After this time the 'kings of Tyburn' all received the name of Ketch. Jack Ketch's immediate successor was 'one Rose, a butcher;' and the last of the Tyburn hangmen was Edward Dennis, condemned for taking part in the No-Popery Riots, but respited, it is said, because his services could not be dispensed with.

TY'BURN-TICKET: a certificate formerly granted in London, under statute William III. (10, 10, c. 23), to a prosecutor who had secured a capital conviction against a criminal, exempting the holder from parish and ward offices with the parish in which the felony had been committed. These tickets were enrolled with the clerk of the peace, and sold like any other property. The privilege that the tickets conferred must have been highly valued, as they sold at a high price. 'Last week,' says the *Stamford Mercury*, 1818, Mar. 27, 'a Tyburn ticket sold in Manchester for £280.' The act under which they were granted was repealed a few months later, 1818, June 3; and they are no longer recognized.—See *Notes and Queries*, 2d series, XI.

TYBURN-TREE, n. *tī'bėrn-trē* [*Tyburn*, London, where felons were formerly hanged]: the gallows (see TYBURN).

TYCHISM, *tī'kism:* a term invented by C. S. Pierce

and given currency in logical discussions. It applies to philosophical theories which give *chance* a real meaning in the progress of the universe. Under most metaphysical views *chance* is simply a name for human ignorance, all phenomena being in reality due to necessary causes. See CHANCE.

TYCOON, n. *tī-kôn'* [Jap. pronunciation of Chinese *ta-kiun*, 'great prince']: the title or style assumed by Iyesada, the Shogun with whom Commodore Perry, on behalf of the United States, concluded a treaty with Japan, and whom both the United States government (in a letter sent by Perry) and Perry himself addressed as 'emperor'—a title to which no shogun had any right, being only a servant of the mikado or emperor. The title *tycoon* was never recognized by the Japanese, but was the common designation of the shogun among foreigners down to the abolition of the shogunate in 1868. Iyesada, however, was not the first to use the title *tai-kun*, for in the middle of the 17th c. it was applied to one of his predecessors (Iyemitsŭ, the third shogun, 1823-49), in a letter sent by his government to Corea.

TYE, *tī*, CHRISTOPHER: English musician of the 16th c.; b. 1500, at Westminster. He was educated in the King's Chapel, and held the office of musical instructor to Edward VI. when Prince of Wales. He received the degree musical doctor from the Univ. of Cambridge 1545 and from Oxford 1548. Under Elizabeth, he was organist to the Chapel Royal, and produced various services and anthems, some of which are yet in repute among musicians.

TYING, v. *tī'ĭng:* imp. of the verb TIE, which see: binding; fastening: N. in *mining*, the process of washing ores.

TYKE, n. *tīk*. See TIKE.

TYLDESLEY, *tĭl-dĕs'lĭ*, WITH SHAKERLEY, *shāk'ėr-lĭ:* town of Lancaster co., England; 11 m. w.n.w. of Manchester, 199 m. n.w. of London; on the London and Northwestern railway. It is a modern town, having had its rise and growth within the 19th c. Its chief industries are connected with its cotton-mills and the extensive coal mines near it. It contains the handsome church of St. George, built 1827 in the Early Pointed style.—Pop. (1901) 15,000.

TYLER, n. *tīl'ėr*. See under TILE.

TYLER, *tī'lėr:* city, capital of Smith co., Texas; on the International and Great Northern, the St. Louis, Arkansas and Texas, and the Gulf Short Line railroads; 19 m. n.w. of Troupe, 250 m. n. of Galveston. It is in an agricultural region; is the seat of the U. S. district and circuit courts, and the state supreme court for the e. district of Texas; and contains county court-house, public library, several churches, Charnwood Institute, the

headquarters of the Gulf Short Line railroad, banks and daily and weekly newspapers.—Pop. (1910) 10,400.

TY'LER, BENNETT, D.D.: Congregational minister: 1783, July 10—1858, May 14; b. Middlebury, Conn. He graduated at Yale College 1804; studied theol.; was pastor of the Congl. church in South Britain, Conn., 1808-22; pres. of Dartmouth College 1822-28; pastor of the Second Congl. Church in Portland, Me., 1828-33; and pres. and prof. of Christian theol. in the new theol. seminary in East Windsor, Conn. (now at Hartford), from 1833 till his death. He was a strongly logical reasoner and an earnest adherent to Calvanistic doctrine; and was one of the leaders in opposition to the 'new divinity' taught in the Yale Divinity School under Dr. Taylor; was author of several historical, doctrinal, and controversial works; and received his degree from Middlebury College 1823.

TY'LER, JOHN: tenth president of the United States. 1790, Mar. 29—1862, Jan. 18; b. Charles City co., Va., son of an officer of the army in the revolution, and a judge of the federal court of admiralty. He entered William and Mary College at the age of 12, graduated at 17, was admitted to the bar at 19, and almost immediately entered on a large practice. At the age of 21 he was elected to the state legislature, supporting the policy of Jefferson, Madison, and the democratic party. He was elected five times almost unanimously; and entered congress 1816. During his long congressional career, he sustained all the measures of the states'-right party. He was elected gov. of Va. 1825, and U. S. senator 1827. He supported Gen. Jackson and the democratic policy; but sided with Calhoun on the question of Nullification. At a later period, however, 1833-4, he supported Clay's resolutions of censure on Gen. Jackson for removing the government deposits from the U. S. Bank. From this period he became an active adherent of Henry Clay, the candidate of the whig or republican party; and was elected vice-president of the United States 1840, with Gen. William H. Harrison as president. President Harrison died 1841, Apr. 4, a month after his inauguration; Tyler thus became president. He began his administration by removing democrats from office, and appointing whigs, and pronouncing in favor of whig measures; but soon afterward vetoed a bill for a U. S. bank, passed by congress, as he believed that congress had no power to create such a corporation within the limits of a state without the consent of that state. Several members of his cabinet resigned; and, after some changes, John C. Calhoun, the great southern democratic statesman, became secretary of state. Tyler's administration was on extreme democratic lines, opposed to the party which had elected him. The most important act of his administration was the annexation of Texas, 1845, Mar. 1. At the close of his term of office, he retired to

private life until 1861, when he was president of a peace convention at Washington. Failing in his efforts at a compromise, he gave his adhesion to the Confederate cause, and was a member of the Confederate congress until his death, at Richmond.

Tyler married Letitia (1790, Nov. 12—1842, Sep. 9), daughter of Robert Christian, a planter of Virginia. She removed to Washington with her husband 1842, but died shortly afterward—the duties of mistress of the White House devolving on her daughter-in-law, Mrs. Robert Tyler.

TYLER, Lyon Gardiner, LL.D.: American educator: b. Sherwood Forest, Va., 1853. He is the son of President Tyler, and was graduated at the University of Virginia in 1875. In 1877 he became professor of belles-lettres at the College of William and Mary. In 1882-8 he practiced law in Richmond, Va., and in 1888 was called to the presidency of the College of William and Mary. He has published: *The Letters and Times of the Tylers* (1884-5); *Parties and Patronage in the United States* (1890); *The Cradle of the Republic* (1900); etc.

TY'LER, Moses Coit, LL.D., L.H.D.: educator: b. Griswold, Conn., 1835, Aug. 2; d. 1900, Dec. 28. He graduated at Yale College 1857, and at the Andover Theol. Seminary 1860; was pastor of the First Congl. Church in Poughkeepsie, N. Y., 1860-62; engaged in lecturing, study, and literary work in England 1863-67; was prof. of the Eng. language and literature in the Univ. of Mich. 1867-81; and from 1881 was prof. of American history in Cornell Univ. He was ordained deacon in the Prot. Episc. Church 1881, and priest 1883, and received the degree LL.D. from Wooster Univ. 1875, and L.H.D. from Columbia College 1888. He published: *The Brownville Papers* (1869); *A History of American Literature During the Colonial Period* (1878); *Manual of English Literature* (1879); *Life of Patrick Henry* (1887); *Three Men of Letters* (1894); *The Literary History of the American Revolution* (1896). His *History of American Literature* is a work of great literary charm and the most thorough scholarship.

TY'LER, Robert Ogden: military officer: 1831, Dec. 22—1874, Dec. 1; b. Greene co., N. Y. He graduated at the U. S. Military Academy 1853; entered the army as brevet. 2d lieutenant of artillery; served principally on the w. frontier till 1860, when he was transferred to New York. In the civil war he took part in the expedition for the relief of Fort Sumter; in reopening communication between Washington and Baltimore; in the defense of Washington; in the Virginia peninsular campaign; and in the principal operations of the Army of the Potomac. He was promoted brigadier-general of volunteers, 1862; brevetted brigadier-general and major-general U. S. A. at the close of the war; and was

afterward transferred to the quartermaster's department, with rank of lieutenant-colonel.

TY'LER, ROYALL: jurist: 1757, July 18—1826, Aug. 16; Boston. He graduated at Harvard College 1776; studied law under John Adams, was aide to General Lincoln for a short time in the revolutionary war and afterward in Shay's rebellion of 1786. He engaged in law practice at Guilford, Vt., in 1790, became judge of the Vermont supreme court in 1794 and in 1800-6 was chief justice. *Reports of Cases in the Supreme Court of Vermont* (2 vols., 1809), constitute his only legal publication, but as a dramatist and a humorous writer he attained a considerable reputation. He was one of the first successful American playwrights, his plays including: *The Contrast* (1786); *May-Day* (1787); *The Georgia Spec* (1797; etc. He was a contributor of humorous prose and verse to the leading periodicals of his day, and also published: *The Algerine Captive* (1797); *Moral Tales for American Youths* (1800); *The Yankey in London* (1809); etc.

TYLOPHORA, *tī-lŏf'o-ra:* genus of plants, of nat. order *Asclepiadaceæ,* natives of the East Indies, New Holland, etc.; with wheel-shaped corolla and five-leaved fleshy coronet. *T. asthmatica,* native of the coast of Coromandel, has high reputation as a medicinal plant: its root has properties like those of ipecacuanha, and has been found of great use in dysentery.

TYLOP'ODA: a group of ungulate mammals, containing the camels and llamas, an ancient group characterized especially by the structure of the feet, in which no traces of the second and fifth toes remain, and the fused metacarpals and metatarsals diverge somewhat at their distal ends. The tread is formed by sole-pads. Singular peculiarities are the elliptical shape of the blood corpuscles, and the character of the rumen-chamber of the stomach. See CAMELIDÆ.

TYLOR, *tī'lėr,* EDWARD BURNETT, D.C.L., LL.D.: antiquarian and ethnologist: b. London, 1832, Oct. 2. He was educated at the Friends' School, Tottenham. His researches have been concerned with the study of human races, their history, languages, and customs. He became keeper of the museum of Oxford University 1883; later, reader in anthropology in that univ.; Gifford lecturer in Aberdeen University 1888. He is author of *Anahuac, or Mexico,* etc.; *Researches into the Hist. of Mankind; Primitive Culture; Anthropology: an Introduction to the Study of Man and Civilization.*

TYMBAL, n. *tĭm'băl.* See TIMBAL.

TYMPAN, n. *tĭm'păn* [F. *tympan*—from L. *tympănum;* Gr. *tumpănon,* a drum, a timbrel—from *tuptō.* I strike: It. *timpano*]: in a platen *printing-press,* the parchment frame on which the sheet of paper is laid before being turned over on the form of type to be

printed. TYMPANUM, n. *tĭm'pă-nŭm*, a drum-shaped wheel with spirally curved partitions, used for raising water for the purposes of irrigation: in *anat.*, the outer membranous wall of the middle cavity of the ear, familiarly called the Ear (q.v.); the cavity itself: in *arch.*, the naked face of a pediment, usually a triangular space or table in the corners or sides of an arch, often enriched with figures; the die of a pedestal; the panel of a door: in *bot.*, a membrane which stretches across the mouth of the spore-case of some urn-mosses. TYMPANIC, a. *tĭm-păn'ĭk*, or TYM'PANAL, a. *-pă-năl*, belonging to the tympanum or drum of the ear. TYMPANIZE, v. *tĭm'pă-nīz*, to stretch, as the skin over a drum-head. TYM'PANIZING, imp. TYM'PANIZED, pp. *-nīzd*. TYM'PANI'TES, n. *-pă-nī'tēz*, or TYM'PANY, n. *-pă-nĭ*, in *med.*, a flatulent distention of the abdomen. TYM'PANIT'IC, a. *-nĭt'ĭk*, relating to, of the nature of, or affected with tympanites.

TYNDALE, HECTOR: American soldier: b. Philadelphia 1821, Mar. 24; d. 1880, Mar. 1. He was engaged in business in his native city during the events just preceding the civil war. With John Brown and his raid in Virginia he had no connection; but on the last visit of Mrs. Brown to her husband Tyndale consented, at the risk of his life, to act as her escort, a duty which, in the face of insult and violence, he unflinchingly performed. At the outbreak of the war he was in Europe, but at once returned and entered the army as major of the 28th Pennsylvania regiment. In April 1862 he was promoted lieutenant-colonel. At Antietam he commanded a brigade, with which he three times repulsed Confederate assaults. Early in the day he was badly wounded, but remained on the field for hours, being finally carried, with a second wound, to the rear. In Nov. 1862 he was made brigadier-general of volunteers for gallantry in that battle. At Wauhatchie by a bayonet charge he captured a hill which was later named Tyndale's Hill. He also took part in a number of battles around Chattanooga. In 1865 he was brevetted major-general. He was a Republican nominee for mayor of Philadelphia in 1868, and was defeated by only 68 votes out of more than 120,000.

TYNDALE, *tĭn'dal* (or TINDALE), WILLIAM: eminent English reformer and martyr, translator of the New Test. and the Pentateuch: about 1484-1536; b. Gloucestershire. He was educated first at Oxford, afterward at Cambridge, and was from his youth, as Foxe says, 'singularly addicted to the study of the Scriptures.' After leaving Cambridge, he became tutor and chaplain in the house of Sir John Walsh, a knight of Gloucestershire, where his religious debates with the clerical dignitaries of the neighborhood soon aroused their wrath. He went to London about the middle of 1523, bent on fulfilling his long-cherished desire of translating the New Testament into English. Finding publication impossible in England, he retired to Germany 1524, visited Luther, and fled from

place to place under persecution, completing his transl. and publication of the New Testament at Worms 1526. This work was conveyed into England, and, though denounced by government, was yet so eagerly received by the people that several reprints were produced by the Dutch printers in the next few years. Tyndale continued on the continent, writing tracts in advocacy of the Reformed doctrines; in 1530 he published his transl. of the Pentateuch, and 1531 one of the prophet Jonah. From 1530 he appears to have dwelt chiefly in Antwerp, where, 1534 and 5, he published two revised editions of his New Testament. He was continuously the subject of plots, and 1535 he was treacherously arrested, and after a confinement of 16 months in the castle of Vilvorde, near Brussels, was publicly strangled as a heretic, and his body afterward burned at the stake at Antwerp.—Tyndale was a man of great learning and talent; and his writings, in addition to his translations, show how well adapted he was for the great work of his life, so fearlessly carried out. Our modern (King James's) version of the New Testament is usually regarded as substantially Tyndale's translation with modernized spelling: see BIBLE, THE.—For bibliography, see Introduction to Mombert's critical reprint of Tyndale's Pentateuch (New York 1884): for biography, see *William Tyndale,* by Rev. R. Demaus, M.A. (1871).

TYNDALL, *tĭn'dal,* JOHN, LL.D.: physicist: 1820, Aug. 21; b. at Leighlin Bridge, Ireland; d. 1893, Dec. 4. He had few educational advantages. On returning from the continent, where he received part of his education, he found employment in one of the subordinate grades of the ordnance survey. He was afterward appointed teacher of nat. philos. at Queenwood College, Hampshire, and there began those original investigations which have distinguished him among explorers of science. 1853, Jan., he communicated his first paper to the Royal Soc., *On Molecular Influences—Transmission of Heat through Organic Structures.* It shows much of that skill in experimenting and fertility of resource which characterize his subsequent researches, and illustrates important questions in natural philosophy. Year by year, Tyndall has extended scientific knowledge. His field of research is wide and varied, as exemplified by the subject of his papers in *Philosophical Transactions: On the Vibrations and Tones produced by the Contact of Bodies having Different Temperatures* (1854); *On the Physical Phenomena of Glaciers* (1857); *On Some Physical Properties of Ice* (1858-9); *On Transmission of Heat through Gaseous Bodies* (1859); series on *Radiation,* six papers (1861-65); *On Calorescence* (1865); *On the Invisible Radiation of the Electric Light* (1865). In 1867 he lectured on *Sounding and Sensitive Flames.* In 1855 and 61 Tyndall was appointed to deliver the Bakerian lecture to the Royal Soc.; the subjects were: *On the Nature of*

the Force by which Bodies are repelled from the Poles of a Magnet; and *On the Absorption and Radiation of Heat by Gases and Vapors, and on the Physical Connection of Radiation, Absorption, and Conduction,* the latter being one of the series on *Radiation* above mentioned. The publication of this series marks an epoch in scientific research, for the facts and conclusions therein set forth demonstrate the relation of aqueous vapor connected with some of the profoundest and most interesting questions of cosmical science.

In 1864 the Council of the Royal Society awarded to Tyndall their Rumford medal, in recognition of his scientific researches, particularly as bearing on Light and Heat. As lecturer on scientific subjects he had high reputation: his lectures at the Royal Institution and the School of Mines are marked by fulness of knowledge and clearness of illustration: he experimented with and wrote on germs and on the acoustic transparency or cloudiness of the atmosphere, and on many other subjects. In 1852 Tyndall was elected a fellow of the Royal Society. In 1853 he was appointed prof. of nat. philos. in the Royal Institution, where, as successor to Davy and Faraday, he sustained the reputation of the place for original research. His lectures at the School of Mines were attended by crowds of working-men. His lines of study and thought were essentially in the natural sciences, and some of his occasional excursions into the regions of metaphysics or theology have not shown his powers at their best. He was LL.D. of Cambridge, and a member of a number of scientific societies on the continent. He was chosen pres. of the British Association 1874. Besides his papers for the Royal Society, Tyndall wrote articles in the *Philosophical Magazine* and *The Fortnightly Review.* Among his many separate works are: *The Glaciers of the Alps, being a Narrative of Excursions and Events* (1860); *Mountaincering in 1861* (1862); *Heat considered as a Mode of Motion* (2d ed. 1865); *Radiation,* the Rede lecture at Cambridge 1865; *Lectures on Sound* (1867); memoir of Prof. Faraday (1868); *Fragments of Science,* and *Hours of Exercise in the Alps* (1871); *Six Lectures on Light* (1873); *Address delivered before the British Association in 1874, with Additions* (1874); *Essays on the Floating Matter of the Air* (1881). In 1872-3 he lectured in the United States, and in 1873 published *Six Lectures on Light, Delivered in America.* He was the recipient of numerous honors from learned bodies at home and abroad, and many of his books were translated. His ability as a speaker fitted him to be a popular expounder of complicated problems in modern physical science.

TYNDARIDÆ, n. plu. *tĭn-dăr'ĭ-dē* [L., the sons of Tyndarus: Gr. *Tundareos, Tundaros*]: in *class. myth.,* Castor and Pollux (q.v.), sons of Tyndarus, King of Lacedæmon.

TYNE, *tīn:* river in n. England, formed by confluence of two head-waters—the North Tyne and the South Tyne. The North Tyne rises on the Scottish border, 11 m. s.e. of Hawick, flows s. across Keelder Moor, and s.e. to Hexham, after traversing a district of picturesque villages and gentlemen's seats. Its chief affluent is the Reed, which rises on Carter Fell and flows s.e. past Otterburn to Bellingham, where it joins the larger stream. Near Hexham the North Tyne is joined by the South Tyne, which rises on the slopes of Cross Fell, 11 m. n. of Appleby, in Westmoreland, flows n. to Haltwhistle, thence e. to Hexham, through a district abounding in old castles and peel-houses. From the junction of the two head-waters, the Tyne flows e. through s. Northumberland, which presents charming scenery and is studded with castles and country seats. At Blaydon—about 8 m. above Newcastle—navigation begins, and from this point, passing Newcastle, Gateshead, North Shields and South Shields, its banks are lined with foundries, furnaces, docks, wharves, and quays. Total length 80 m. The Tyne owes its importance to the valuable mineral district through which it flows.—See Guthrie's *River Tyne: Its History and Resources* (1880).

TYNEMOUTH, *tīn'mŭth* or *tĭn-:* small village and parish of Northumberland, England; on the n. bank of the river Tyne, near its mouth—hence the name. It is 8 m. e. of Newcastle by railway, and its light-house is in lat. 55° 1′ n., long. 1° 25′ w. Though itself only a village, it gives name to a township, most of which, however, is comprised in the town of North Shields (see SHIELDS, NORTH). It also gives name to a parliamentary and municipal borough, including, besides the village of Tynemouth, the large town of North Shields and the three villages Chirton, Preston, and Cullercoats. The village of Tynemouth is much frequented as a watering-place by the inhabitants of Newcastle. Its sands, about a mile in length, form an excellent bathing-ground. There are many attractive buildings and institutions, as the castle and fortifications, the fine ruins of a priory and Lady chapel, the Master Mariners' Asylum, etc.—Pop. of township 21,000; of borough (1881) 43,863; (1891) 46,267; (1901) 51,390.

TYNER, *tī'nėr,* JAMES NOBLE: American lawyer: b. Brookville, Ind., 1826, Jan. 17; d. 1904. He was admitted to the bar of Indiana, but later gave up his practice to enter political life. In 1869 he was elected to congress from Indiana, and served until 1875, when he was appointed postmaster-general. He remained in the cabinet until 1882. In 1889 he was made assistant attorney-general for the post-office department, in which capacity he served until 1893. Four years later he was reappointed to this office, but resigned in 1903.

TYNG, *ting*, STEPHEN HIGGINSON, D.D.: Prot. Episc. clergyman: 1800, Mar. 1—1885, Sep. 4; b. Newburyport, Mass. He graduated at Harvard College 1817; spent two years in mercantile business; studied theol. in Bristol, R. I.; and was ordained in the Prot. Episc. Church 1821. In 1821–23 he was rector in Georgetown, D. C.; 1823–29 in Prince George co., Md.; 1829–33 of St. Paul's, and 1833–45 of the Church of the Epiphany, both in Philadelphia; and 1845–78 of St. George's in New York. He was retired from his last charge as rector emeritus, with a pension. He received his degree from Jefferson College, 1832 and Harvard 1851. T. was noted for his fervid and pungent pulpit eloquence, and as a vigorous leader of the 'low church' clergy in the denomination. At various times he was editor of the *Episcopal Recorder*, the *Theological Repository*, and the *Protestant Churchman;* and was a founder of the Evangelical Knowledge Soc., the American Church Missionary Soc., and the Evangelical Education Soc. He was popular and effective in addresses on temperance and patriotic subjects; and published, among many theological and biographical works, *Lectures on the Law and the Gospel* (Philadelphia 1832); *Forty Years' Experience in Sunday-schools* (New York 1860); *The Prayer-book Illustrated by Scripture* (8 vols. 1863–67); and *The Office and Duty of a Christian Pastor* (1874).—His son, STEPHEN HIGGINSON T., Jr., D.D. (b. Philadelphia, 1839), was rector of Holy Trinity Church (Prot. Episc.), New York, 1865–81; but resigned and became manager in Paris of the European interests of an American life insurance company.

TYPE, n. *tīp* [F. *type*, type—from L. *typus;* Gr. *tupos*, a figure, an image on a wall—from *tuptein*, to strike: It. *tipo*]: a mark of something; an emblem, sign, or symbol; a general form which gives character of similarity to others; a figure of something to come; the design on a medal; the shape or form of a letter of the alphabet in metal or wood, or the prism-shaped piece of metal or wood on the face of which such a letter has been formed (see below); a peculiarity in the form of a disease; the primitive idea or pattern of a work of art, having its existence in nature; the perfect representation or idea of anything: in *biol.* and *nat. hist.*, the characteristic representative of a class, genus, or species, in which its most ideal peculiarities are realized, or such a group, class, genus, or species; compare *Archetype*, the simple essential plan common to all divisions and members of a sub-kingdom or class: V. to typify. TYPIC, a. *tĭp'ĭk*, or TYP'ICAL, a. *-ĭ-kăl*, emblematic; figurative; indicative rather than positive; in *bot.*, etc., applied to a specimen which has eminently the characteristics of the species, or to a species having the characteristics of an order; representing something future by a form, model, or resemblance. TYP'ICALLY, ad. *-lĭ*. TYP'ICALNESS, n. *-nĕs*, the state of being typical. TYP'IFY, v. *-fī* [L. *facĭō*, I make]: to represent by an image or resemblance; to foreshadow; to prefigure. TYP'IFYING, imp. TYP'IFIED, pp. *-fīd*. TYP'IFICA'TION, n. *-kā'shŭn*, act of typifying. TYPE-FOUNDER, a manufacturer of types for printing. TYPE-FOUNDRY, a

place where types are manufactured. TYPE-METAL, an alloy of lead, antimony, and tin, used in making types. TYPIC FEVER, a fever that is regular as in its attacks, or follows a regular type, as distinguished from *erratic* fevers, which are irregular in their attacks, or appear at undeterminate intervals.

TYPE, in Theology: image or representation of some object which is called the Antitype (q.v.) In theological use, T. denotes chiefly, though not exclusively, those prophetic prefigurings of the persons and things of the New Dispensation which are found in the ritual and the history of the Old Testament. See HERMENEUTICS: EXEGESIS: for the different senses of which the literal text of Scripture is considered susceptible. Of one of these, the 'mystical,' a further subdivision is the 'typical' sense. The word 'type' itself is used by the writers of the New Test. (Acts vii. 43; Rom. v. 14; Phil. iii. 17); also by the Jewish historians, e.g., Philo, *Opp.*, t. I., 108; and while Paul and other sacred writers speak of the ancient types of things to come, Peter completes the parallelism by describing baptism as the antitype of the ark of Noah, I Pet. iii. 21. Of the types of the Old Test., many are directly pointed out as such in their very institution; many also are distinctly applied in the New Test. There is a large class, however, which more properly fall under the mystical sense of Scripture, and which are called indirect, i.e., 'adaptive' or 'applied,' types: in application and interpretation of these, many of the Fathers, and especially Augustine and Gregory the Great, are amazingly elaborate and ingenious.

TYPE: a right-angled prism-shaped stamp or die of wood or metal having on one end (the face) a letter or character in high relief, used in Printing (q.v.). The name is used also for the aggregate of such lettered dies, as well as for the particular style or variety of letter impressed by them. The earliest types (in this last sense) were in the style known as Gothic or Black Letter (q.v.); this was superseded, except in Germany, by Roman and Italic. The top of a type is its 'face;' the lower end on which it stands is grooved, thus forming 'feet;' the 'shoulder' is the part on the top which projects beyond the letter; from the shoulder to the foot is the 'shank' or 'body;' and the front or 'belly' of the shank has a nick or nicks across it to serve as a guide to the type-setter in placing the type in his 'stick' (see TYPE-SETTING).

The sizes of type used at the present day are very numerous, ranging from *brilliant*—the minutest kind, used in printing vest-pocket Bibles—to those used in placards and posters. In book-work about 16 sizes are in use. *Brilliant*, the smallest regular size, has about 239 lines to the lineal foot; *gem*, next in order, 222; *diamond*, 207; *pearl*, 178; *agate* (or *ruby*), 166; *nonpareil*, 138; *minion*, 122; *brevier* (in which this is printed), 111; *bourgeois*, 102½; *long primer*, 89; *small pica*, 83; *pica*, 71½; *English*, 64; *great primer*, 51¼; *double pica*, 41½; and so on. All sizes larger than *canon* (about 17⅘ lines to the foot) are named by the

regular multiples of pica, English, etc., according to the class respectively—e.g., *two-line pica*, *two-line English*, *four*, *six*, *eight*, or *ten-line pica*, etc. Some of these names were given from the first maker; others from the books first printed with the particular letter. Thus, *Cicero* is the name of a type in France and Germany, with which Cicero's letters were first printed (Rome 1467); *pica* is from the service of the mass, termed *Pica* or *Pic; primer*, from *Primarius*, the book of Prayers to the Virgin; *brevier*, from *Breviary; canon*, from the *canons* of the church: etc:

In the United States the common unit of size is the 'point' (about $\frac{1}{72}$ of an inch), adopted 1883 by the United States Type-founders' Assoc. The point system, however, originated in France 1737, and is now in general use there and in Germany. The point in use in the United States is slightly smaller than the French point, 12 of the latter being nearly equal to 13 points of the former. In this system brevier is called 8-point, minion 7-point, nonpareil 6-point, pica 12-point, etc.

All kinds of types are sold by weight by the founders, the price varying in amount according to the size of the letter—the smallest size being the most expensive. In the *diamond* size ($4\frac{1}{2}$ points) 2,800 go to a single lb. of the letter *i*, and of the thinnest *space* about 5,000.

A complete assortment of types is called a *Font*, which may be regulated to any extent. A font of 1,000 lbs. would contain about 514 lbs. of Roman lower-case (i.e., small letters), 86 lbs. of capitals, 20 lbs. of small capitals, 40 lbs. of figures, 28 lbs. of points, 85 lbs. of spaces, 122 lbs. of Quadrats (q.v.), 5 lbs. of fractions, 73 lbs. of italic lower-case, 23 lbs. of italic capitals, and 4 lbs. of sundries. Every type-founder has a scale showing the proportional quantity of each letter required for a font; and a peculiar scale is required for every language. For the Eng. language, the following is a type-founder's scale for the small letters of a font of types of a particular size and weight:

a	8,500	h	6,400	o	8,000	v	1,200
b	1,600	i	8,000	p	1,700	w	2,000
c	3,000	j	400	q	500	x	400
d	4,400	k	800	r	6,200	y	2,000
e	12,000	l	4,000	s	8,000	z	200
f	2,500	m	3,000	t	9,000		
g	1,700	n	8,000	u	3,400		

It appears from this scale that the letter *e* is used much more frequently than any other character. The standard height of type in Great Britain is ·9166 inch; in the United States it varies from that to ·9186 inch. See TYPE-FOUNDING: TYPE-METAL: TYPE-SETTING.

TYPE-FOUNDING: the casting of metal type for use in printing. In the early days of printing, the type used by printers were cast by themselves; but as the art developed, type-founding as a distinct business became necessary.

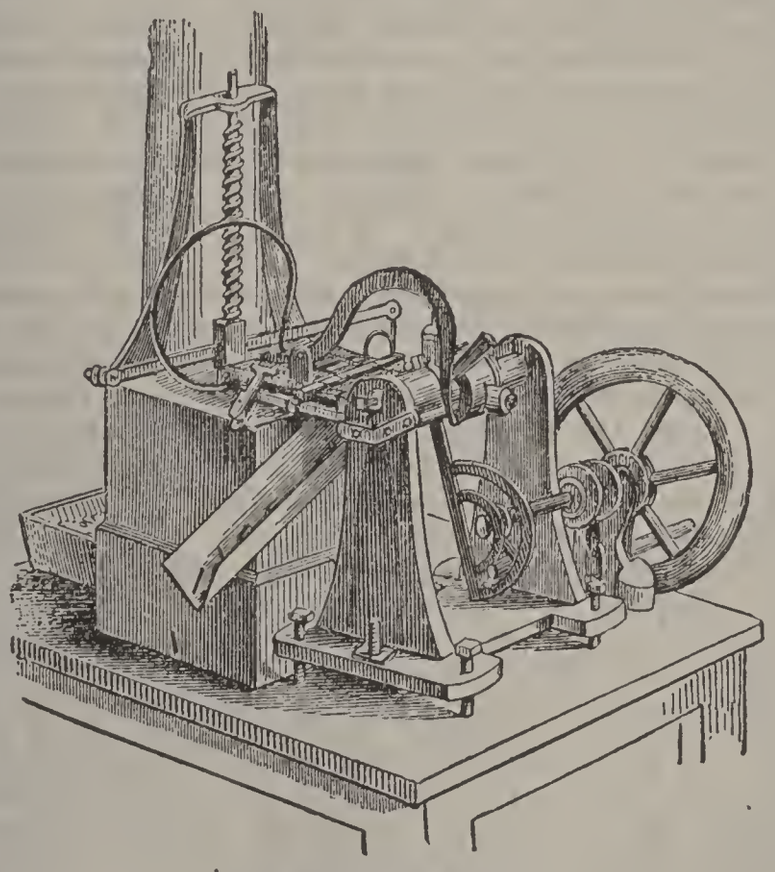
Type-founding originated in Germany with printing; as early as 1452, P. Schöffer (see GUTENBERG) had substituted types of cast-metal for the original wooden types. The earliest and best punch-cutters were in Nürnberg, which for a time supplied the type-founders throughout Germany with punches. Bodoni (1740–1813) in Italy, the Didots (q.v.) in France, and Breitkopf (1719–94) in Leipzig, are the most distinguished names in the subsequent history of type-making on the continent. The art made little progress in Great Britain from the time of Caxton, and the types used were mostly imported from Holland, until about 1720, when William Caslon, originally an engraver of ornamental devices, turned his attention to letter-cutting, and soon established such a reputation as not only put a stop to importation of foreign types, but caused his own to be frequently sent to continental countries: the foundry established by him in London is still in existence. Baskerville (q.v.) is the next greatest name in the history of the art in England. The types produced by Alexander Wilson, of Glasgow, became the foundation of the fame of the Foulis (q.v.) as printers. The type-foundry of Miller & Richard in Edinburgh has had well-merited reputation for more than half a century, which it still maintains. In the United States many improvements have been introduced.

At the beginning of the 16th c. the apparatus for type-founding was much the same as till near the middle of the 19th c. The first step in the process is the cutting of a punch or die resembling the required letter. The punch is of hardened steel, with the figure of the letter cut, the reverse way, on its point. This die is struck into a piece of copper about an inch and a quarter long, one-eighth of an inch deep and of width proportionate to the size of the type to be cast. This copper, being so impressed with the representation of the letter, requires to be adjusted to the mold in which the type are to be cast, so that the 'face' or impression of the punch (in the copper) may be brought into such relation with the metal which forms the 'body' or stalk of the type that when the types are 'set up' they may stand at the proper distance from each other, and be in 'line' or range, and also square to the page: this work is termed 'justifying,' and the copper when so justified and squared is termed a 'matrix.' The matrix is then fixed into a small instrument or frame, called the mold, composed of two parts. The external surface is of wood, the internal of steel. At the top is a shelving orifice, into which the metal is poured. The space within is of the size of the required body of the letter, and is made true. The melted metal, being poured into this space, sinks down to the bottom into the matrix, and, instantly cooling, the mold is opened, and the type drops out. This process

of casting types is executed with great celerity. Every separate letter in the alphabet, every figure, point, or mark, must have its own punch and matrix. In casting types, the founder stands at a table, and has beside him a small furnace and pot with heated metal (see TYPE-METAL), which he lifts with a small ladle.

Various attempts were made during the early part of the 19th c. to cast type by machinery. The first successful apparatus was the invention of Elihu White, of New York. This has been modified and repeatedly improved by David Bruce, a Scotsman resident in the United States. The type-casting machine was introduced into Great Britain, and patented by Miller & Richard, of Edinburgh, 1848. This machine requires a man to drive it, but produces more than double the quantity produced by hand in any given time, while the finish and regularity of the type are much more perfect. Another machine was constructed and patented some years after by the same firm, with the view to apply steam for driving, which was successfully completed 1860, and is now the approved system of casting.

The type-casting machine consists, first, of a small melting-pot, which contains the molten metal and is placed over a small furnace having an outer case of cast-iron.



Type-casting Machine.

In the interior of the pot is arranged a forcing-pump and valve for admitting the metal under the piston, by the action of which the molten metal is forced through a narrow channel leading from the bottom of the chamber in which the piston works to the outside of the pot, where

there is a nipple, with a small hole through it. Against this nipple the mold in which the type is formed is pressed at the moment at which the piston descends, and so receives the molten metal that forms the type.

The second part of the machine is that which carries the mold, and to which it is firmly bolted. The mold is similar to the old hand-mold, but modified to suit the machine; it is much stronger; the 'jets' are shorter, and the orifice by which the metal enters is smaller, so that it may be made to coincide exactly with the small hole in the nipple in front of the pot. The mold—as the old hand-mold—is made in halves; one being firmly bolted to an arm which, by cams and levers, is made to oscillate, and carry the mold to and from the nipple in front of and above the pot: the other is bolted to another arm, which, by a peculiarly formed hinge, is attached to the first arm, so that the two halves of the mold may be made to open and shut on each other, like the lid of a snuff-box; and so both sides of the mold oscillate together to and from the nipple in the pot from which they receive the molten metal. The operation of the machine is as follows: the piston being raised in the chamber of the pump, and the chamber being supplied with metal through the valve, the mold is brought against the nipple; the valve closes, to prevent the metal being forced back into the pot; the piston descends, and forces the metal through the narrow channel into the mold; the mold then recedes from the nipple, and in receding the two halves separate from each other, and eject the type; the mold again approaches the nipple, and in approaching the two halves close together, and are ready for another operation. A blast of cold air is directed upon each mold, to keep it cool.

When the type drops from the mold, it is in a rough state; and as soon as a heap has accumulated on the caster's table, the types are removed by a boy, who breaks off a superfluous tag of metal, or 'jet,' hanging at the end of each. From the breaking-off boy the types are removed to another place, where a boy rubs or smooths their sides on a stone. When well smoothed, they are removed to a table, and set up in long lines upon a 'stick' (see TYPE-SETTING): they are then dressed or finished, and after being examined by a magnifying-glass are ready for use. Whatever be the size of the types, they all are made of uniform height (see TYPE), and must be perfectly true in their angles, otherwise it would be impossible to lock them together: a single irregular type would derange a whole page. All the types of one class of any founder are always uniform in size and height; and to preserve their individuality, all the letters, points, etc., belonging to one class are distinguished by one or more notches or nicks on the body of the type, which range evenly when the types are set. These nicks are useful also in guiding the hand of the compositor. Types are all equally grooved in the bottom, to make them stand steadily.

TYPE-METAL: alloy of lead, regulus of Antimony (q.v.), and tin, used for making the types (see TYPE) used in printing and for stereotypes (see STEREOTYPING; TYPEFOUNDING). The antimony gives hardness and sharpness of edge to the composition, while the tin gives toughness and tenacity, and removes the brittleness which antimony causes when used without tin. The proportion generally used in making type-metal for small type consists of about 100 lbs. of lead, 40 lbs. of antimony, and 20 lbs. of tin. For larger sizes reduce the proportions.

TYPES, CHEMICAL: compounds of two or at most of three elements, supposed to persist through long series of complex compounds. By this theory, water, H_2O, represented thus, $\left.\begin{matrix}H\\H\end{matrix}\right\}O$, would be the type of all alcohols, one atom of the H giving place to an alcohol radical, e.g., to C_2H_5, to produce ethyl alcohol, C_2H_6O, or $\left.\begin{matrix}C_2H_5\\H\end{matrix}\right\}O$. The *ammonia type*, NH_3, represented thus, $\left.\begin{matrix}H\\H\\H\end{matrix}\right\}N$, includes the nitrides and phosphides, the ammonia compounds, and the amides: thus, ethylamine, C_2H_7N, = the above ammonia type, with one of its hydrogen atoms replaced by C_2H_5. The *hydrochloric acid type*, $\begin{matrix}H\\Cl\end{matrix}$, includes the chlorides, flourides, iodides, bromides, cyanides, etc.: thus benzoyl chloride, C_7H_5OCl, = $\begin{matrix}C_7H_5O\\Cl\end{matrix}$.

TYPES, MENTAL: the study of individual differences indicates that there may be certain characteristic forms of metal constitution found in particular groups of people. We would thus have the criminal type, the degenerate, the genius, the adolescent, the scientist, etc. The attempt to describe the fundamental traits of such groups has not as yet produced any clear and accepted definitions. It has been suggested that anatomical and psycho-physical measurements and tests may serve in time to determine the average and variation of such types, but no such records are as yet available. Psychologists recognize two types of observers in a psychological laboratory. Those who yield themselves passively to contemplate the changes in the external stimulus are called by Stern the objective type, and those whose observations are colored by what they expect or what is suggested to them, the subjective type. The use of the term type to refer to differences in a single function or faculty of the mind is also approved. We thus have types of memory, of volition, of association, of ideas, of emotions, etc. The study of defects of speech has especially contributed to the detection of pronounced differences in the manner of thinking among individuals. See TEMPERAMENT; MEMORY; APHASIA.

TYPE-SETTING: the art or act of combining type in proper order for printing; called also 'composing'—hence a 'type-setter' is called a 'compositor,' and the setting of the type 'composition.' In type-setting a 'composition' is performed by picking up the types one by one, each out of its own box in the Cases (q.v.), which rest on a 'composing-frame,' and placing them side by side, face up, and the nicks in front, in a small hand-tray, called a 'composing-stick' (of wood, brass, or iron), with a movable slide, which, by means of a screw, may be regulated to any width of line. In either case, the composing-stick is made perfectly true and square. When the compositor arrives at the end of his line, he has a task in which great carefulness is required. The first letter and the last must be at the extremities of the line: there must be no large spaces left in some instances, and crowding in others. Each type is of a constant thickness, as far as regards that particular size of letter; though all the letters are not of the same thickness. The adjustments, therefore, to complete the line with a word, or with a syllable, must be made by varying the extent of the spaces between the words. A good compositor's work is distinguished by uniformity of spacing; he will not allow the words to be very close together in some instances, with large gaps between them in others. In setting up poetry, or similar matter, where there is a blank space at one end of the line, spacing is easily accomplished by filling up the blank with larger spaces, or *quadrats*. But whether prose or poetry, the matter of each line must be equally adjusted and *justified*, so as to correspond in compactness with the previously set lines. The process of composing is greatly facilitated by the compositor using a thin slip of brass, called a *setting-rule*, which he places in the composing-stick when he begins, and which, on a line being completed, he pulls out, and places on the front of the line so completed, in order that the types he sets may not come in contact with the types behind them, but glide smoothly into their places.

Fig. 1.

When the compositor has set up as many lines as the composing-stick will conveniently hold, he lifts them out by grasping them with the fingers of each hand, thus taking them up as if they were a solid piece of metal. He then places the mass in an elongated board, termed a *galley*, which has a ledge on one or perhaps both sides. The facility with which some compositors can lift what is called a *handful* of movable type without deranging a single letter is remarkable. This sort of skill can be attained only by practice. When the compositor has set up as many lines as fill a page, he binds them tightly round with cord, and removes them from the galley.

Sometimes, as in the case of newspaper and similar work, the *handfuls* of type are accumulated till they fill the galley, and in that form are prepared for press. After the matter is thus far prepared, it is the duty of the pressman to take an impression or *first proof* from the types, in order

that the first-proof *reader* may compare with 'copy,' or MS.; after which it is handed to the compositor, so that he may correct the errors which are sure to have been made. Proofs are taken usually by a press kept for the purpose. After the galley matter is corrected and recorrected by the compositor, it is divided into pages of the size wanted; and head-lines or figures indicating the number of the page being added, the pages are arranged upon a large firm table, and there securely fixed up or 'locked' in an iron frame or *chase*, by means of slips of wood and wedges, or *quoins*. The annexed cut is a representation of a small *form*, consisting of four pages of type.

This process, called *imposing*, being completed, and the face of the types levelled by a *planer* and mallet, the *form*, as it is called, is proved, and prepared for press. From

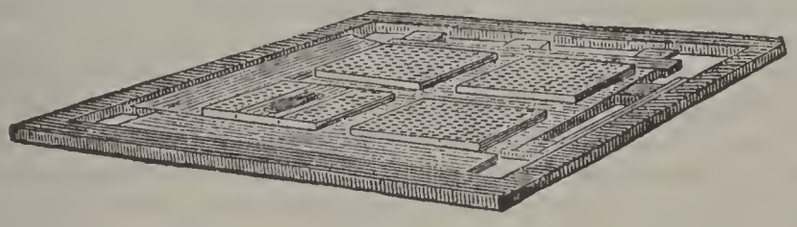


Fig. 2.

this is cast the stereotype, when that is to be used to print from: see STEREOTYPING. The imposing-table is usually of smooth stone, or marble, or cast-iron, on the top, and requires to be a substantial fabric.—See TYPE: TYPE-FOUNDING: LINEOTYPE: TYPE-SETTING AND TYPE-DISTRIBUTING MACHINE.

TYPE-SETTING AND TYPE-DISTRIBUTING MACHINE: mechanical invention to supersede the setting and the distributing of printing-types by hand. The first type-composing machine on the records of the Eng. patent office was that of W. Church, 1822, Mar. This, after 20 years, was followed by a number of others; but none were satisfactory. It is in the spacing out of the words so as to neatly fill up a line, which is called 'justifying,' that the early machines failed, because another operator afterward had to space the machine-setting into lines of equal length. It is comparatively easy to construct a machine which will, by some mechanical arrangement, set up type, in any required order, but with *exactly equal spaces* between the words; and the difficulty of justifying has only recently been surmounted.

In the early composing-machine by Church, 'the types are arranged in files in a case at the top, each file being directly over a slit in a horizontal frame. One of a number of jacks protrudes through each of these slits, each jack being connected with a key in a manner somewhat similar to the jacks and keys of a harpsichord.' This description conveys the leading idea in most of the type-composing machines invented since 1822.—Hattersley's machine, patented 1857, has somewhat analogous movements, but different mechanism and details. A machine on Hattersley's principle, with details much improved by Alex.

Fraser, of Edinburgh, was in use by a large printing-firm there: with it an operator can compose from 'copy' at the rate of from 10,000 to 12,000 types per hour; but this rate could not be maintained continuously, the strain of such rapid setting being too great for the operator.

A type-distributing machine being quite as important as a composer, one was invented by Fraser—recently improved, according to patent 1884, July 24. In general appearance it resembles his composer, but with face-plate inverted. Three of these distributing-machines are required to keep pace with two of his composing-machines

A type-composing machine invented by a German named Kastenbein was in operation many years in the London *Times*-office: it is on the same principle as the foregoing, but its details have been improved from time to time. A composing-machine on a different principle, invented by Mackie, somewhat resembled the Jacquard loom.

Among early machines were two of William Mitchel, Irish inventor—one for setting, another for distributing the type. The types were distributed by notches on their sides, a characteristic notch or notches being used for each letter. This machine was experimented with in New York, and much work was done with it; but, like many other type-setting machines, it was found not economical. —The next development took the form of matrix-producing machines: in these, type-faces were struck against a soft *papier-maché* or equivalent surface so as to give a matrix, the reverse of type, upon which a stereotype plate could be cast.

The approved recent machines may more properly be termed stereotyping-machines, of the Mergenthaler and of the Rogers class. In both of these machines, movable matrices are employed, which are moved into line by the operator, who works the keys of a key-board. Between each word the small end of a wedge-shaped 'space' is inserted. When the end of the line—as near as may be judged, and as determined by the division of syllables and other considerations—is reached, a single movement by the operator presses up all the wedge-shaped spaces until the matrices just fill the line. Melted metal is then run upon the matrices, and a solid block containing one line of type is produced. As regards speed, an ordinary compositor can set by hand 1,000 to 1,200 ems per hour. One-third additional of his time is required for distribution. For the new machines 5,000 to 6,000 ems per hour are claimed: moreover, no time is expended in distribution, as the machines effect this operation in their regular operation: see LINOTYPE. There are in use at the present time (1897), in printing and newspaper offices, a number of type-setting machines of different patterns, such as the Thorne, Empire, and Macmillan. These machines only set type and do not justify it or cast it when set.

TYPE-WRI'TER: machine for superseding handwriting by a mechanical process. The first successful T.-W. was an American invention, and was so far perfected soon after 1874 that many thousands were then being made to supply the demand.

The archives of the Brit. patent office show that in 1714 a patent for a writing-machine—the first T.-W. known—was applied for by Henry Mill, London engineer. No drawing of his machine is extant, and its construction is not known. In 1784 a French invention appeared, designed to make embossed or raised characters for the blind.—In 1843 Charles Thurber, then of Worcester, Mass., secured a patent for a T.-W., and two years later a second patent: his machines were never perfected for practical use. In 1855 Foucault invented a writing-machine for the blind: he was followed by English inventors; but none of the machines came into practical use. In 1856 Alfred E. Beach, of New York, one of the proprietors of the *Scientific American*, secured a patent for a T.-W. which embodied the characteristic basket-like disposition of type-bars and type used on the Remington and other standard machines of to-day. The Beach machine was for printing embossed letters for the blind. Contemporaneous with this inventor, Dr. S. W. Francis, of New York, was working on the same line. He arranged his keys in a circle around the instrument, used an inking-ribbon, a travelling paper-frame, and an alarm-bell, rung as the end of the line was approached, thus embodying many features of the instruments of to-day. Thomas Hall, of New York (inventor of the Florence sewing-machine), also was experimenting on a T.-W. about this time. In 1859 he learned of the prior patents and tried to purchase them. 1867, June, he obtained a patent of his own; and one of his machines, printing large and small letters, was shown at the Paris Exposition 1867. The paper was placed on a table, which slid under the bottom of the machine. The spacing for letters varied with their thickness, thus producing work more resembling that of type than does the identically spaced type-writing of recent machines. Hall struggled against much discouragement, and never succeeded in bringing his machine into use. John Pratt, of Center, Ala., secured a U. S. patent 1868 for what he called his pterotype—a complicated machine which did not come into public use.

This brings us to the recent history of the T.-W. Charles Latham Sholes, of Milwaukee, Wis., with Samuel W. Soule and Carlos Glidden, became associated: the first two were trying to construct a numbering-machine: Glidden suggested developing the idea into a T.-W. After months of work, Sholes left the others, and with James Densmore, of Meadville, Penn., as financial backer, pushed the invention to completion, and secured a patent 1868, June. In 1873 it was put on the market as the Sholes and Glidden T.-W. E. Remington and Sons, of Ilion, N. Y., were to make the machines; and in 1874, the year when the first one was really on sale, 400 were sold. These early machines printed only one kind of letter. The intro-

duction of small letters occurred 1877, and many minor improvements have since been introduced. The Remington T.-W., as it is now called, is characterized by the 'shift,' by which the same keys print large or small letters as desired. The radial type-bars, forming when at rest a sort of basket, also are characteristic. The Remington type-writer somewhat resembles a sewing-machine in appearance. On the top is a roller covered with India-rubber; and by its side, and parallel, a small wooden roller. Between these the top edge of a sheet of paper is inserted, and brought into proper position to receive the first line of 'writing.' Immediately under the rubber cylinder, and in line with its axis, is the ink-ribbon; and beneath this there is a circular opening, several inches in diameter, in the case containing the mechanism. At a point in the centre of this opening, every letter is made to appear in succession to do the writing. The types are of iron, and are fixed in the ends of a series of levers about 3 inches in length, each lever having its fulcrum at a point in the circumference of the opening. These type-levers are in fact suspended around a kind of well, their short arms being connected with a series of wires actuated by keys which are worked by both hands similar to the way in which a piano is played. The key for forming the spaces between the words extends the whole length of the key-board, so that it can be readily worked, no matter in what position the hands may be at the close of every word. The depression of each key causes the letter with which it is connected to rise quickly in the well; and, when raised, it strikes the ink-ribbon, thereby transferring the form of the letter to the paper. On removal of the pressure, the type descends by its own gravity. When a single letter is printed, the paper and its cylinder are, by means of a coiled spring, traversed at each touch of the key, from right to left of the machine, the precise distance required to admit of the next letter being impressed. At each touch of the key, too, the ink ribbon is advanced a corresponding distance. After a line is completed, the paper-cylinder is moved back by a peculiar arrangement to the right of the machine, and the pressure of a lever causes it to make a partial revolution, which forms the space between the two lines of the 'writing.'

The Caligraph, invented and developed by George W. N. Yost, uses no shift, but has a separate key for each character: in other respects it resembles the Remington.

The Hall T.-W., patented 1881, Mar. 3, was an innovation. It is very small, and in it a sheet of rubber type-faces is used, and the letters are brought to the right position by a sort of pantograph motion. A die or punch is then brought down upon the back of the sheet over the letter, by the operator, thus impressing the letter on the paper. His machine introduced the era of small and lower-priced machines.

In 1880, Feb., a patent for a T.-W. was granted James B. Hammond, of New York. The type-faces were carried on the periphery of sectors of circles. These were slipped on a vertical pin and rotated around it. Three such sectors

gave three sets of types, thrown into action by two 'shifts.' Instead of striking the type against the ribbon and paper, a hammer gave the paper a blow from the back against the ribbon and type-face. The force of the blow came from a spring, so that an even force was always secured. This feature is one of the most important characteristics of the Hammond machine. The Remington class projects the type against an inking-ribbon, back of which is the paper—the latter receiving the blow, and being backed by a roller. Another class of machine has no ribbon, but uses an inking-pad. The type-face strikes this first, and then strikes the paper directly.

The different classes of machine are now very numerous. The Remington still holds a leading position and is a standard machine.—In 1885 a large company was formed in London to manufacture an unusually simple and cheap T.-W., weighing only 2½ lbs., sufficiently portable to be worked in a railroad car. The roller carrying the paper to be written on is placed on a small carriage which moves forward and backward on rails. At right angles to this roller, and slightly raised above it, is the type-bar—the writing, or printing, being executed by moving an indicator, held between the finger and thumb, to any letter on the index, and pressing it down lightly.

As regards speed, a rate of 50 words a minute is good ordinary work; 70 or 80 words is very fast; 90 or 100, exceedingly fast.

TYPHA, *ti'fa:* genus of plants, of nat. order *Typhaceæ* of some botanists, which, according to others, is a suborder of *Araceæ*. The *Typhaceæ* all inhabit marshes or ditches. They have nodeless stems, unisexual flowers arranged on a spadix without a spathe, the spadix of the male flowers being at the summit of the stem, above that of the female flowers, the perianth consisting of scales or lax hairs, the anthers on long filaments, the fruit dry, consisting of the seed with adherent pericarp. They are found in very different climates and scattered over the world. Two species of T. are found in Europe, *T. latifolia* and *T. angustifolia*, popularly known as CAT'S-TAIL or REED-MACE. *T. latifolia* is the most common, and naturalized abundantly in the United States, where *T. angustifolia* is less common; it may be distinguished by the channelled shape of the leaf-bases, and an interval between the staminate part and the lower downy pistillate portion of the club. It is sometimes called Bulrush. It grows to the height of five or six ft. The root-stocks are astringent and diuretic, and abound in starch. The young shoots of this and *T. angustifolia*, a smaller plant, are much eaten by the Cossacks of the Don; hence known elsewhere under the name *Cossack Asparagus*. The pollen of T. is inflammable, like that of *Lycopodium*, and is used as a substitute for it. *T. angustifolia* and *T. elephantina* are used in India for making mats and baskets.

TYPH-FEVER, *tĭf'fē-vĕr:* continued low fever. The best-marked varieties of this affection are known as typhus and typhoid fevers, which in typical cases are easily distinguished from one another, but frequently so merge into one another that it is difficult to decide whether the disease should be classed as typhus or typhoid; hence the general term Typh-fever is convenient in doubtful cases. All the typh-fevers belong nosologically to the miasmatous order of zymotic diseases.

TYPHLITIS, n. *tĭf-lī'tĭs* [Gr. *tuphlŏs*, blind]: inflammation of the cæcum.

TYPHOID FEVER. *Synonyms.*—Entero-Mesenteric Fever, Gastric Fever, Enteric Fever, Intestinal Fever, Autumnal Fever, Pythogenic Fever.

Typhoid fever is an acute infectious disease, due to a specific microbe, the *Bacillus typhosus*, which causes inflammation and ulceration of the lymph follicles of the bowels, enlargement of the mesenteric glands, and alterations in the internal structure of other organs. These effects, while nearly always constant, vary in intensity, and there are cases in which such a septic state of the system ensues that the disease spends itself upon the cerebrospinal membranes, the kidneys, lungs, and spleen.

Etiology.—To Eberth is due the credit of isolating the *Bacillus typhosus*, the specific microbe of typhoid fever, a short, thick motile bacillus, with rounded ends, in one or both of which may be seen a glistening round body. The bacillus is always present in typhoid fever and can be grown outside of the body. It is destroyed quickly by temperatures of 140°F. and above, but it may resist a temperature below freezing indefinitely. It succumbs to the direct rays of the sun in a few hours.

The bacilli exist in the lymphoid tissues of the intestines, in the mesenteric glands, the spleen, bone-marrow, liver, and the bile. They are to be found in the bowel contents and in the stools. In a majority of cases they may be shown in the blood and in the rose spots of the body. They are met with less often in the urine and rarely in the sweat and sputum. They have also been obtained from endocardial vegetations, meningeal and pleural exudates, and from pus in various situations.

Methods of Transmission.—Typhoid fever is spread by the discharges of fever patients, containing the bacilli, being thrown upon the surface of the ground, whence they are washed by rains into springs, wells, cisterns, streams and other sources of water supply. Thus arise extensive and serious epidemics, or the germs may dry upon the soil and be conveyed through the air in dust to contaminate the fountains from whence water is drawn; and the germs carried with the dust may also be blown directly upon individuals who inhale them through the mouth and nostrils. Again they may be washed or blown upon ice, fruits, lettuce, celery, water cress, onions, radishes, etc., and with them ingested. Uncooked food of any kind,

particularly oysters and clams, may be carriers of the disease. Milk is a fruitful means of conveyance, this fluid being infected through the water supply, or by the hands of the milker, in rare instances. Direct contact with the stools and secretions of patients may cause infection, and it may be spead through soiled clothing of patients in the wash. The sweat, tears, sputum and nasal discharges of typhoid cases may all contain the germs, through which secretions they may be transmitted over to those in contact with them. Flies often play an important part in spreading the infection. Filth promotes the dissemination of the disease by supplying favorable conditions for the sustentation and increase of the bacilli. The germs may be destroyed by immersion in a corrosive sublimate solution of a strength of 1 to 2,000, or, in a carbolic acid solution of 1 to 200.

Systemic Infection.—Besides the local action of the bacilli in the intestinal glands, they multiply and are carried to internal organs, whence they create disturbances to which the fever is due in large part. The period of incubation corresponds to the time required for the growth of the microbes. In the greater proportion of cases the lymphoid glands of the intestines are the structures most affected, together with the spleen and mesenteric glands. There are cases in which the intestinal lesions are so slight that they may not be noticed, or they may have healed in the course of the disease, but it is doubtful if the *Bacillus typhosus* enters the system in any other way than through the intestinal wall. There are *double infections*, in which the bacillus of tuberculosis, the diphtheria bacillus, the malarial plasmodium, the colon bacillus, the streptococcus, staphylococcus, and the pneumococcus play secondary roles, all of which are readily distinguishable. *Poisons* are generated by the typhoid bacilli. Of these there have been extracted typhotoxin, a ptomain, and a toxalbumin which has a definite action upon animals.

Pathology.—A general congestion, or catarrh, obtains throughout the whole intestinal canal, which probably causes the diarrheal discharges. There is an enlargement of Peyer's patches and of the lymphatic glands in the jejunum, ileum, and large intestine. The glands are swollen, of a grayish white color, and they project beyond the surface of the mucous membrane. The solitary glands also project. At the onset the follicles are congested. Later, from cell multiplication in the lymph tissue, there is infiltration of the mucous and muscular layers, compressing the blood-vessels, and giving the follicles a whitish appearance. The cell infiltration is greater towards the lower end of the ileum, attains its acme at the eighth or tenth day, and eventuates in resolution or gangrene. With resolution the cells undergo fatty and granular changes and become absorbed. From the rapid disintegration of the follicular cells the follicles shrink more than their surrounding framework, giving rise to little pits,

and presenting a honeycomb appearance. This disintegration may cause superficial hemorrhages and small ulcers. From the cell growth and infiltration the circulation is cut off, and sloughs form which must be thrown off. The tissue destruction may involve only the mucous surface, or extend to the muscular layer, or it may pass through the latter to the peritoneum, and even perforate that. It is always greater toward the ileocecal valve, and in very severe cases the lower part of the ileum may be converted into a brownish black strip. The ulceration resulting from the sloughing varies greatly in size and depth; most commonly it does not extend beyond the mucous coat. It is rare for an entire Peyer's patch to slough away. The ulcers in general are irregularly ovoid and rounded. Toward the lower part of the ileum ulcerated patches several inches in extent may exist, filled in with islands of mucosa. Healing begins with the formation of small granulations covering the base, to which the mucosa extends, and new epithelium is formed, with a reformation of granular elements. The cecum and colon are involved in about one-third of the cases, and the ulcers are usually larger in the former. The solitary glands are sometimes greatly enlarged.

Perforation of the intestine ensues in a small proportion of cases, and causes a notable percentage of mortality. It usually occurs in the lower portion of the ileum. It results from sloughing and from distention, with rupture, of the ulcerated intestine. In general the site of perforation is at the bottom of small deep ulcers. A number of perforations may sometimes be found. In the large intestine the sigmoid flexure is more commonly the part perforated. *Peritonitis* always follows perforation. Perforation is announced by sudden severe pain, restlessness, and distention of the abdomen.

Hemorrhage is not an unfrequent cause of death. It arises from the separation of sloughs and may also come from the soft swollen edges of Peyer's patches. Spots of necrosis are not uncommon in the mesenteric glands and a rupture of one of these into the peritoneum may occasion fatal hemorrhage.

The *Spleen* changes consist of an enlargement and softening of the organ, and often infarction.

The *Kidneys* show granular degeneration of the cells of the convoluted tubules, and sometimes the signs of acute nephritis. Late dangers are areas infiltrated with round cells containing typhoid bacilli, which may also appear in the urine. In many cases only cloudy swelling is present. Diphtheritic affection of the pelvis, of the kidney and of the bladder with catarrh of the latter organ may also occur.

Larynx and Lungs.—Ulceration of the larynx is an infrequent complication, as is also edema of the glottis. Diphtheria of the larynx and pharynx, with catarrhal and diphtheritic ulcers, sometimes occurs. Lobar pneumonia and hypostatic congestion of the lungs are common

incidents Hemorrhagic infarctions, gangrene, and abscess of the lungs, while unusual, may be met with. Pleurisy is a rather rare event.

Heart and Blood Vessels.—Endocarditis is occasionally met with; pericarditis is not so rare, and myocarditis is not uncommon. With the exception of granular and fatty degeneration of the muscular elements, and, in a few cases, proliferating endarteritis of small vessels, other changes have not been noted.

Inflammation of arteries with formation of clots, containing bacilli, in the vessels, is not infrequent in typhoid fever, and gangrene may result. A clot may be washed into the artery from the heart, but in most cases the blocking is due to arteritis. Thrombosis in the veins is a much more frequent and less serious event. It occurs more often in the femoral vein, and in the left more frequently than in the right.

Changes observed in the *Nervous System* have not been very noteworthy. They have been such as result from inflammation of the meninges, with serous, serofibrinous, and purulent exudations into the ventricles, with the presence of the *Bacillus typhosus*. Meningitis is only an occasional complication.

Muscular degenerations are granular and hyaline, and are such as may take place in any febrile disease of long continuance.

Clinical History.—The time of incubation is from eight to fourteen days, in rare cases three weeks. During this time there are feelings of exhaustion, disinclination for physical exertion, and headache. There are loss of appetite, diarrhea or constipation, and often bleeding of the nose. The facial aspect is heavy, the eyes dull and the patient slow in responding. Commonly there are cough and symptoms of a mild bronchitis. The appearance of fever marks the commencement of the disease. The pulse ranges from 90 to 110, is full but compressible. The tongue is covered with a whitish coating, and the abdomen is somewhat distended and tender. There is tenderness and gurgling in the right iliac fossa.

The first week the fever gradually rises from day to day, reaching the highest point in the evening. Toward the end of the week the headache disappears, but there may be mental confusion, or delirium, particularly at night if the fever is high. At the end of the week the temperature may reach 103° or 104°F., or even higher in severe cases.

The commencement of the second week the rose colored spots appear, first upon the abdomen. They are rose red, slightly raised, flattened papules, disappearing under pressure of the finger, and slowly reappearing. They remain two or three days and fade away leaving a brownish speck. Successive crops appear. They may be spread over the whole anterior part of the body, and appear also upon the back. In some cases they are absent altogether. The temperature ranges more even from day

to day and from morning to evening. In severe cases it is intensified, the lips and tongue become dry, the delirium is more pronounced, and the diarrhea, tenderness, and tympanites are increased. In this second week death may occur from hemorrhage, or perforation, or in consequence of complications. In mild cases the temperature falls and may even reach normal by the third week.

The third week the pulse rate may increase to 120 or more, the temperature fluctuates more, with decided morning remissions, and the fever gradually lowers. There is loss of weight and great weakness. Pulmonary complications, cardiac weakness, and profound delirium with muscular tremors are grave signs. Perforation and hemorrhage are dangers to be feared.

The commencement of the fourth week usually ushers in convalescence. The temperature declines to normal in the morning and all unfavorable appearances subside. In severe cases the tongue and lips are dry and covered with brownish deposits as are also the teeth. The pulse is feeble and rapid. There are deep stupor, delirium, and twitching. The urine and feces are voided unconsciously. Cardiac syncope and complication are occurrences to be feared.

Cases may be prolonged into the fifth and sixth weeks, or longer; or cases may relapse after convalescence begins, and continue to the seventh or eighth week. The sequelæ and complication of the disease are frequently met with at this time.

There are variations from the slow uncertain onset of the disease. It may commence with a chill simulating malaria, sometimes with cerebrospinal symptoms, again with drowsiness and delirium, eventuating in mania. Other cases at the onset may be taken for pleurisy, pneumonia, or tuberculosis.

Very rarely an ambulatory, or walking form, of the disease may be encountered, in which the patient persists in keeping up and dressed, through the day. The temperature in these cases may run high, 104° or 105°F., and they are more liable to end unfavorably.

The Blood.—In this fluid during the third week there is a diminution in the number of red corpuscles and in the amount of hemoglobin. The white cells are decreased in number below the normal throughout the whole course of the disease. The large leucocytes, with a single nucleus, may be increased in number, but the smaller polynuclear bodies may be decreased to 50 per cent. With acute complications these cells undergo an increase. These facts have a value in diagnosis.

Endarteritis, embolism, thrombosis, and phlebitis, with obliteration of the vessels, and infarction of various parts have been already mentioned. In consequence there occur edema, gangrene, sloughing ulcers, abscesses, and septic poisoning. Any organ or part of the body may be thus affected.

Peritonitis without perforation is not so rare an accompaniment of the disease. It is by no means incompatible with recovery.

Parotitis, or inflammation of the parotid gland, usually on one side, is a rare event. It is commonly regarded as an unfavorable complication.

Neuritis, either local, affecting the arms or legs, or general, involving the trunk and head as well, is not infrequent. Multiple *neuritis* may come on during convalescence. Recovery while delayed, is not otherwise disturbed. *Poliomyelitis* is a more serious complication, but fortunately it is very rare. *Hemiplegia* is also rare. A mild form of insanity is occasionally a sequel of typhoid fever, which disappears with the return of strength.

Albuminuria exists in a large proportion of cases and has no special significance. *Nephritis*, however, may occur during convalescence and greatly retard the recovery. *Pyuria* is not uncommon. Retention of urine is not infrequent and the distention of the bladder may produce great pain and uneasiness.

Bone affections, periostitis, necrosis, and caries are among the most common and disturbing of the late manifestations. The lesions are chronic and stubborn, and in old bone sinuses typhoid bacilli have been found after the lapse of seven years or more.

Noma, or skin grangren, is a rare occurrence in children.

General Observations.—The sexes are equally susceptible to typhoid fever. It is most frequent in youth and early adult life, and it is rare after fifty years of age. After forty years of age the mortality rate progressively increases. On the part of some there is a resistance to the infection. Others are more liable to it. One attack usually confers immunity, but in rare instances a second attack may be experienced.

The disease is growing milder in type and the mortality rate less, complications do not so often occur, ulceration of the bowel is not so extensive, hemorrhage, perforation, and peritonitis are much less common. The bacillus seems to be abating in virulence. In children the disease pursues a milder course than in adults, the mortality is much less, and the fever may terminate at the end of the second week.

There are many variations in the temperature range. Occasionally at the onset the temperature is high—103° to 104° F., or it may be of an inverse form, higher in the morning and lower in the evening. Sudden falls below normal indicate the occurrence of hemorrhage. It is not unusual after convalescence is established, following on constipation, errors of diet, or excitement, for the temperature suddenly to rise to 102° or 103° and return to normal in two or three days. *Hypothermia*, or temperature below the normal, is not uncommon in protracted cases with anemia and emaciation. Very rarely cases occur with all the features of the disease, but without fever. Usually the skin is dry in typhoid

fever, but occasionally instances of the *sudoral* form are met with, marked by profuse sweating throughout the course of the disease. In some cases from the onset there is great prostration, high fever, low delirium and unconsciousness, due to the toxic action of the bacilli upon the nervous centres and the heart.

Relapses.—Relapses occur in about ten per cent. of the cases. They are usually less severe and of shorter duration than the original attack. Rose spots reappear and the spleen is enlarged. The relapse is generally ascribed to indiscretion in diet, to exertion on the part of the patient, or to excitement. It is probably due to reinfection from bacilli remaining in the bile passages which find entrance into the intestine. The mortality is low from relapses.

Diagnosis.—In a typical case of typhoid fever, the long prodromal period, the epistaxis and headache, the constant character of the fever with its regular temperature curves, the gurgling and tenderness in the right iliac region, and the rose-colored spots appearing upon the abdomen the second week, together with the absence of symptoms pointing to other diseases, furnish data sufficient to determine a case of typhoid fever. When the onset is irregular and there is a question as to the nature of the disease, it may be decided for or against typhoid by microscopical examinations of the blood and body fluids. The detection of the typhoid bacilli in the blood, urine, or stools establishes the typhoid infection. The decrease of leucocytes in the blood has also a special value in diagnosis since it is an early sign. The diazo reaction of Ehrlich, and the serum agglutination tests of Widal and others are useful accessories, but they cannot be wholly relied upon since they have failed to give reaction throughout typical cases of the disease.

Prognosis.—It is difficult to fix a death rate for typhoid fever, so variable has it been in different epidemics in different localities, from the meager statistics of private practice. But the hospital mortality rate has averaged about 14 per cent., and that of private practice about seven per cent. In recent years improved sanitation, a uniform dietary, good nursing, methods of reducing the pyrexia, and serum inoculations, have so modified the disease and limited its spread that the mortality from it has been much reduced below that given above.

The disease is more fatal in women than in men, and fat subjects succumb more readily than the thin. High fever toxemia, meteorism, and hemorrhage are unfavorable omens. Complications increase the gravity. Perforation is an almost hopeless event but prompt surgical intervention may be the means of saving some otherwise fatal cases. Instances of sudden death occasionally occur, more often in men than in women, where the cause is obscure, but probably due to toxic action upon the musculature of the heart.

Prevention.—Since the disease is caused by a germ that

finds its way into the intestine through the water and food supply, and through dust inhalation, it naturally follows that persons should be very scrupulous concerning what they ingest. All water and milk should be well boiled unless the latter has been inspected and certified by a milk commission, and there should be abstention from uncooked food, unless it is positively known to be free from infection. Filtration of water does not render it sterile. It must be *boiled*. Filters may become prolific breeders of disease germs. In bathing, too, it is well to remember that water in the neighborhood of populous places is liable to be contaminated, and to be careful that it does not gain access to the mouth, nose, or ears.

In the care of a typhoid case, the room occupied should be bare of carpets and draperies, and contain as little furniture as possible. Everything in it should be kept perfectly clean. After handling the patient the hands of the attendant should be scrubbed and disinfected. Everything used in connection with the case, as spoons, dishes, etc., should be thoroughly boiled before passing into other hands; and all soiled clothing of patient or bed should be kept in a closed receptacle, and, after disinfection, boiled by itself without admixture with the family wash. Stools and urine should be well mixed, and permitted to stand for an hour, with equal amounts of solution of carbolic acid of the strength of one pound to two and a half gallons of water, before being poured into the sink. Discharges from the patient should never be thrown upon the soil. When the patient is convalescent the room and its contents, after a thorough scrubbing with disinfectants, should be well fumigated with sulphur.

Treatment.—There is no specific treatment for the disease. In the initial stage a dose of five or six grains of calomel has an antiseptic effect by unloading the intestinal canal of mephitic products and it has a germicidal action at the same time, lessening the number of bacilli and carrying them off. Aside from this, except when the temperature mounts too high, and when complications arise, the care of a case of typhoid fever is largely a matter of the administration of the proper diet and of careful, intelligent nursing.

Diet.—The diet should be exclusively liquid,—milk, whey, buttermilk, chocolate, gruels of oatmeal, corn meal, and barley, broth of chicken, beef, and mutton, eggs, apple sauce, jellies, and fresh vegetable juices. The patient should have nourishment every two hours through the day, but need not be disturbed through the night unless awake. The milk snould be diluted one-half with lime, or aerated, water. The gruels and apple sauce should be strained through a fine sieve. Eggs may be given with the whole egg beaten up in milk or water, or the white may be strained through a cloth and mixed with water. If there is diarrhea, the broth, apple sauce, and vegetable juices should be withheld.

After the end of the third week, when the temperature

has returned to the normal in the evening, beefsteak and custards may be allowed, the former broiled rare, finely cut up, and thoroughly chewed. In three days more, if no elevation of temperature supervenes, dry toast, scalded, the variety of sponge cake known as 'lady fingers,' and reception flakes may be added to the diet. At the end of a week broiled or stewed chicken, lamb chops, broiled or boiled fish, rare roast beef, baked potatoes, and rice may be allowed, together with spinach and asparagus.

Cool water should be freely supplied. Iced tea, lemonade, and orange juice may be given in moderate amounts. Whiskey or brandy, as a rule, are not beneficial in typhoid fever, but they are to be administered when there is marked weakness and failing pulse.

Bathing is of the utmost advantage in the disease to control the temperature, and give comfort to the patient. It may be in the form of the sponge bath, every two or three hours, according to the range of the thermometer, with tepid, cool, or ice-cold water, as affect is desired. Or the patient may be placed in a bath tub with his head supported by a rubber pillow and his body by a canvas sheet, in water of 75° F., which can be gradually cooled or raised as may be required. The time in the bath should be fifteen or twenty minutes. The bath tub is inadmissible in cases with great weakness, abdominal pain, hemorrhage, peritonitis, and phlebitis. In general, when the temperature does not rise above 103½°, the sponge and tub baths may be employed. Above that temperature phenacetin in doses of seven grains reduces the temperature, usually within a half-hour, and it has no depressing action upon the heart. It produces perspiration and a sensation of chill. It quiets the nervous centres, and a quiet sleep is commonly enjoyed after its exhibition.

Abdominal pain and distention from tympanites may be relieved by hot turpentine stupes. Where there is great tympanites or meteorism a turpentine enema may be given. If constipation exists a very effective means of inducing a stool and relieving meteorism is a rectal injection of from one to four teaspoonfuls of pure glycerin once daily.

Diarrhea may be checked by a powder of calomel ⅛ gr., opium ½ gr., and camphor ½ gr. *Hemorrhage* from the bowels calls for full doses of acetate of lead and opium, together with absolute quietude. An ice-bag should be applied over the abdomen and cracked ice may be given by the mouth. If it has been severe, injections of physiological salt solution under the skin of the chest or into a vein may be required.

Peritonitis without perforation is occasionally met with. This is to be combated with hot turpentine stupes changed every twenty minutes, and the administration of eight drops of Norwood's tincture of veratrum viride every two hours until it shows its slowing action upon the pulse and produces perspiration with nausea, when there will probably be a subsidence of the inflammatory process.

Should severe abdominal pain suddenly develop with great restlessness, abdominal distention, frequent respiration, and a small and rapid pulse the indications are that perforation has occurred. In such event a surgeon should be summoned without delay.

Bone complications call for the attention of a surgeon.

Heart weakness or symptoms of collapse should be treated with hypodermic injections of whiskey, nitroglycerin, strychine, camphor, digitalis, or physiological salt injections.

When bacilli exist in the urine a urinary antiseptic should be given in seven grain doses four times daily, until they disappear. It is a good routine practice to give the remedy for two or three days of every week although there may be no bacilluria.

A careful attention to diet during the period of convalescence is of the utmost importance. The temperature must be closely watched, and should it register two or three degrees above the normal a return to liquid diet should be made at once.

TYPHON, n. *tī'fŏn* [Gr. *Tuphōn;* L. *Typhon*]: the evil deity of Egyptian mythology; in *L.* and *Gr. myth.*, the giant Typhōeus, son of Seb (Kronos) and Nut (Rhea). The latter gave birth to five children on the last five days of the year—first, Osiris and Haroeris, then Typhon and lastly Isis and Nephthys. The Egyptian name of Typhon was Set, also Suti and Su'ech, and in the earliest times he was a highly venerated god. He often appears on the monuments in the form of a beast, the crocodile, the hippopotamus, or the ass, and with yellow hair and long blunted ears. From him the kings of the 19th dynasty, Seti (Sethos, Sethosis, changed by Herodotus into Sesostris), derive their name. The city of Ombos was a special seat of his worship. In later times, either about the close of the 21st dynasty or afterward, his worship was abandoned, and his figure and name were obliterated from many of the monuments. The cause of this curious religious revolution is unknown; but, at any rate, Typhon came to be regarded as a god hostile to the Egyptians.

The connection between the Egyptian *Set* and the Greek Typhon seems beyond doubt, but is not easily traceable. According to Homer, Typhon (called also Typhāon) was a huge giant, chained under the earth in the country of the Arimoi, and lashed by the lightnings of Zeus. Hesiod makes him son of Tphōeus and a hurricane; and, by the snake-goddess Echidna, father of the Chimæra, the many-headed dog Orthus, the hundred-headed dragon that guarded the apples of the Hesperides, the Colchian Dragon, the Sphinx, Cerberus, Scylla, Gorgon, the Lernæan Hydra, the Eagle that consumed the liver of Prometheus, and the Nemean Lion. Typhōeus, again, was the youngest son of Tartarus (Hell) and Gæa (Earth), or, as others say, of Hera (Juno). The later poets modify the older

myth with fabulous additions of their own. They connect T. with Egypt—an evidence that he had come to be identified with the Egyptian *Set.* According to Ovid and others, all the gods fled before him into Egypt, and, through fear, changed themselves into animals, excepting Zeus and Athene. After an appalling struggle, in which Zeus was once hamstrung and carried off by the daring monster, T. was vanquished, but not before he had hurled all Mount Hæmus against his adversary, in a paroxysm of supernatural rage. It is very possible that the fierce *physical* opposition of T. (especially when the monster came to be identified with *Set,* the Egyptian Satan) may have had (with other causes) a material influence in determining that popular conception of Satan which reigned both in patristic and mediæval times, and of which Milton availed himself in *Paradise Lost.*

TYPHOON, n. *tī-fōn'* [Chin. *ta,* great; *fŭng,* wind: the word has been confused with, and influenced in its spelling by, the L. *typhon;* Gr. *tuphōn,* a whirlwind (see TYPHON)]: name given by navigators to one of those tremendous rotatory storms of wind or hurricanes that visit the coast of Tonquin and China as far n. as Ningpo and the s.e. coasts of Japan. Varenius, in his *Geographia Naturalis,* describes them as 'storms which rage with such intensity and fury that those who have never seen them can form no conception of them; you would say that heaven and earth wished to return to their original chaos.' Typhoons are the cyclones of the e. Asiatic coast. They occur from May to Nov., but are most frequent during July, Aug., and Sep. They resemble the great storms of w. Europe (see STORMS) in their general characteristics, but with the main features more strongly marked. There is a depression of the barometer, over a space more or less circular, accompanying the T., but it is generally more contracted in area, and deeper and more abrupt than in European storms. It is not uncommon for the barometer, at the centre of the depression, to read 28·3 inches, and on rarer occasions to fall even as low as 27 inches; and the changes of pressure are very rapid, frequently ·2 or ·3 inch in an hour. It is this enormous difference of atmospheric pressure between neighboring places, and the consequent rapidity of the fluctuation, which gives the T. its terribly destructive energy—the law regulating the strength of the wind being, that it is proportioned to the difference of pressure between the place from which it comes and the place toward which it blows. The low pressure in the centre is confined to a very limited space; and since all round this space the pressure is greater, it follows that the level of the sea there will be higher. Hence a high wave frequently accompanies a T., advancing inland, carrying with it ruin and dismay, and sometimes bearing ships far over the level fields, where they are left stranded.

Typhoons have their origin in the ocean e. of China, especially about Formosa, Luzon, and the islands immediately south. They thence proceed, in four cases out of five, from e.n.e. toward w.s.w., rarely from e.s.e. to

w.n.w., and scarcely ever from n. to s. or from s. to n.; in other words, their course is generally along the coast of China. The whole body of the typhoon advances at the rate of 12 m. or more an hour; within the body thus travelling the winds blow often 80 to 100 m. an hour, whirling round the center of atmospheric depression in a direction contrary to the motion of the hands of a watch, as do all storms in the northern hemisphere. They thus rotate in the directions s., e., n., w.; and travel along the coast, so that the coast feels the n. side of the typhoon, while at a distance from the coast the s. side alone is experienced. The rotation, however (according to the latest authorities), is in circles not returning on themselves, nor opening outward by their centrifugal motion, but tending to blow somewhat inward upon the centre of lowest pressure: see CYCLONE: STORMS: METEOROLOGY: ETC. The s.w. Monsoons prevail in summer over s. Asia, to the eastward of what are the n.e. trade-winds: see WINDS. Here, then, are two great aerial currents flowing contiguously, *but in opposite directions,* each highly charged with moisture, especially the s. w. current, which they have taken up from the oceans that they have traversed; and one of the many theories has been, that typhoons take their origin from these opposing currents, like whirlpools at the meeting of two sea-currents. Their intensity is aggravated by the large quantity of heat disengaged in the condensation of the vapor of the atmosphere into the deluges of rain which fall during the storm—10 to 12 inches of rain frequently falling in one day.—See STORMS.

TYPHUS, n. *tī′fŭs* [Gr. *tuphos,* smoke or stupor—from *tuphein, to smoke*]: in *med.,* a very fatal form of fever, contagious and generally epidemic, characterized by much depression, the appearance of an eruption on the skin, and a tendency to putrefaction. TY′PHOUS, a. *fŭs,* pert. to or of the nature of typhus. TY′PHOID, a. *-foyd* [Gr. *eidos,* resemblance]: pert. to a low form of fever, characterized by general depression and an eruption of the skin, with morbid changes in the intestinal canal. TY′PHOMA′NIA, n. *-fō-mā′nĭ-ă* [*typhus,* and Gr. *mania,* madness]: the low muttering delirium which accompanies typhoid fever.

TYPHUS FEVER. See TYPHOID FEVER.

TYPIC, TYPICAL, TYPIFY: See under TYPE.

TYPOGRAPH, *tī′pō-grăf,* a type-making and type-setting machine of recent invention.

TYPOGRAPH′ICAL UNION OF NORTH AMERICA: a society of typesetters banded together for mutual protection, for the regulation of wages, fixing the number of apprentices allowed to each establishment, the length of time each apprentice must serve in order to become a master workman, and for extending general aid to the members of such association.

TYPOGRAPHY, n. *tī-pŏg'ră-fĭ* [Gr. *tupos,* a type or figure; *graphō,* I write]: the art or operation of printing (see below): particularly, the preparation of matter in type for printing, or the result of that printing as regards general character and appearance, as, the *typography* is good (see below). TYPOGRAPHIC, a. *tī'pō-grăf'-ĭk,* or TY'POGRAPH'ICAL, a. *-ĭ-kăl,* pertaining to the art or act of printing; employed or made in printing; in *OE.,* emblematic; figurative. TY'POGRAPH'ICALLY, ad. *-lĭ.* TYPOGRAPHER, n. *tī-pŏg'ră-fẽr,* a printer. See PRINTING.

TYPOLOGY, n. *tī-pŏl'ŏ-jĭ* [Gr. *tupos,* a type or form; *logos,* discourse]: the doctrine of types or figures: see TYPE.

TYPOTHE'TÆ: a name given to a trade guild consisting of persons connected with the printing trades, both workmen and employers. In the year 1465 the Emperor Frederick III. of Germany 'permitted the printers to wear gold and silver, and both the typographi and typothetæ were honored by him with the privilege of bearing coat-of-arms, and wearing armor. The shield of the typothetæ bore an eagle with extended claws, and the open helmet was surmounted by a crown.' The first use of the name in the United States was in 1863, when P. C. Baker of New York proposed the name for a society of employing printers in that city. The name was adopted, but the society did not survive long. In 1883 the New York society was resuscitated, and the name readopted. From that city similar organizations spread all over the country. The Typothetæ has local and international organizations, and is benevolent and fraternal in some of its aspects.

TYR, *tĭr:* in Old Norse mythology, the god of war; called in Anglo-Saxon *Tiv, Tiw,* and in Old High German *Ziu or Zio.* He was son of Odin, and was, according to the Edda, single-handed. When the Asa-gods persuaded the wolf Fenrir to allow himself to be bound with the bandage Gleipnir, Tyr put his right hand in the wolf's mouth, as a pledge that he would be loosened; and when the gods refused to release him, the wolf bit off Tyr's hand to the wrist, which was called, in consequence, *Ulflithr,* or the Wolf's Joint. In the twilight-battle of the gods, he meets his death at the same time with his enemy, the monster dog Garmr. The Old Norse Runic character ᛏ bore the name of the god. The third day of the week, too, the *Dies Martis* of the Romans, is called after him, in Old Norse, *Tyrsdagr;* Ang.-Sax. *Tivesday* (from which our English *Tuesday*); Old Friesic, *Tysdei;* Old High German, *Ziuwestac;* in n. Germany, *Tiestac* or *Diestac,* from which the German of the present time, *Dienstag.* Place, and particularly hills and plants, were named after him. The word Tyr appears in epithets of Odin, signifying god in a general sense—e.g., *Sigtyr,* i.e., the god of victory; also in epithets of Thor, as *Reidhartur,* god of the chariot or of thunder.

TYRANT, n. *tī'rănt* [L. *tyrannus;* Gr. *turannos,* a ruler, a king: It. *tiranno;* F. *tyran*]: *originally,* a king or ruler, especially one who had obtained power illegally; a usurper; *now,* a ruler or sovereign who uses power to oppress: one who abuses his rule or authority by acts of oppression and cruelty; a despotic ruler; an oppressor. TYRANNICAL, a. *tī-răn'nĭ-kăl,* pert. to a tyrant, that acts as a tyrant; unjustly severe; arbitrary; despotic; cruel. TYRAN'NICALLY, ad. *-lĭ.* TYRAN'NICALNESS, n. *-nĭ-kăl-nĕs,* despotic disposition; oppressive exercise of power. TYRAN'NIC, a. *-nĭk,* in *poetry,* tyrannical. TYRAN'NICIDE, n. *-nĭ-sīd* [from *tyrant,* and L. *cædo,* I cut, I kill]: the act of killing a tyrant; one who kills a tyrant. TYRANNIZE, v. *tĭr'ăn-nīz,* to act the part of a tyrant; to rule with unjust and oppressive severity. TYR'ANNIZING, imp. TYR'ANNIZED, pp. *-nīzd.* TYR'ANNOUS, a. *-nŭs,* tyrannical; arbitrary. TYR'ANNOUSLY, ad. *-nŭs-lĭ.* TYR'ANNY, n. *-nĭ,* the government or acts of a tyrant; an arbitrary or despotic exercise of power; cruelty; unjust severity.—*Tyrant,* in modern usage, is an arbitrary and oppressive ruler; but originally it meant a ruler who had obtained power illegally, and was therefore equivalent to our word *usurper.* The ancient Greek 'republics' were generally aristocratic and even oligarchic in their constitution. When the 'governing families' among the Athenian or Syracusan nobles, e g., quarrelled with each other, it was natural, if they could not otherwise agree, that the boldest and most reckless of the set should seek for success by allying himself with the masses of the people, should figure as their champion, promise to redress their wrongs or increase their comforts, and, when a fitting occasion offered, should, by a clever or violent stratagem—*coup d'état,* it is now called—deliver them from the domination of his order by himself grasping absolute power, and ruling without any other restraint than the necessity of retaining his popularity—even this limitation being frequently absent when a body-guard of foreign mercenaries rendered it superfluous. If the political adventurer who thus rose on the ruins of the constitution happened to be a man of sense and wisdom and generosity, his 'tyranny' might prove a blessing to a state torn by the animosities of selfish oligarchs, and be the theme of praise in after-ages, as was the case with the 'tyrannies' of Peisistratos (q.v.), Gelon (q.v.), Hiero II. (q.v.), and many others; but if he was insolent, rapacious, and cruel, then he sought to reduce the citizens to a worse than Egyptian bondage, and his name became infamous to all time—e.g., most of the 'Thirty Tyrants of Athens' (q.v.), particularly the blood-thirsty Critias, Alexander of Pheræ, Dionysius the Younger, etc. Such outrages gave the word tyrant in later antiquity that evil significance which it has ever since retained.—See Plasz, *Die Tyrannis bei den Griechen* (Bremen 1852); Wachsmuth, *Hellen. Alt.,* I. 279–288; and Histories by Thirlwall and Grote.

TYRANT-SHRIKE, or TYRANT FLY-CATCHER: see KING-BIRD.

TYRCONNEL, *tĭr-kŏn'nĕl* (Richard Talbot), Duke and Earl of: born early in the 17th c., d. 1691, Aug. 14. In his youth, according to Lord Macaulay, he was 'one of the most noted sharpers and bullies of London.' Soon after the Restoration (q.v.), he contrived to make himself welcome at the palace both as a votary of its pleasures and as a counselor in affairs of state. Immediately on the accession of James II., he was made earl of T., and put in command of the troops in Ireland; and, 1687, by fawning, rallying, and bribing, he got the office of lord-deputy of Ireland. His arrival in that country spread dismay through the Eng. Prot. population. Nearly every office of dignity in the country was soon transferred to the hands of Roman Catholics. The long-dominant Prot. party complained bitterly that appeal to law was vain; judgment in every case being given for the native against the Englishman. But the revolution of 1688 had a sobering effect on his rule, and he would probably have submitted to William III.; but the Irish people threatened that, if he dared sell them for wealth or honors, they would burn the castle and him in it, and put themselves under protection of France. On James's arrival in Ireland 1689, the earl was created Duke of Tyrconnel. After the fatal battle of the Boyne (q.v.), at which he held high command, he retired to France. In 1691 he returned to Ireland, to further the efforts still made in behalf of James. Notwithstanding the defeat of Aghrim (1691, July 12) and the capitulation of Galway, he made preparations for defense of Limerick, binding himself and his countrymen by an oath not to surrender until they received permission from James, then at St. Germain—at the same time dispatching a letter in which he stated his conviction that all was lost. Before an answer could arrive, he was struck with apoplexy, and died.

TYRE, *tīr* (Phœn. *Sûr* or *Sôr*, rock): the most famous city of ancient Phœnicia, lat. 33° 12′ n., named probably from the double rock on which it was first founded. It was doubted among the ancients themselves whether T. or Sidon was the older, and the question is not settled; though it seems certain that T. had long existed independently when Sidon, defeated by Ascalon, transferred herself almost bodily to T. (see Phœnicia). There were two towns of T. closely connected in historical times—one on the continent, the other on the island opposite, together comprising (according to Pliny) about 19 Roman m. The more important of the two was the continental town, Palæ Tyrus; while the island-town served more or less for storehouses, manufactories, arsenals, and the like. The entire city was in a fertile region; and its magnificent combination of land and sea scenery formed the theme of many an ancient poet and seer.

Nothing but myths have come down to us respecting T. in its earlier period. Its history dawns on us with Abibal, predecessor of the biblical Hiram, under whose rule (B.C. 980–947) T. attained its full glory and renown. An alliance with Solomon was entered into; trading expeditions were undertaken jointly by the Israelites and the Phœni-

cians; and Solomon is supposed even to have married Hiram's daughter. During Hiram's reign, T. was much enlarged and embellished; and its two roadsteads and harbors, among the wonders of the ancient world, date probably from the same period. He was followed, according to ancient writers, by Balæastartus; after him reigned, for brief periods, his four sons, by the murder of the last of whom the throne became hereditary in the House of Ithobaal, the Ethbaal of Scripture, whose daughter was married to King Ahab. T. then appears to have gained the supremacy over Sidon, and also spread her colonies far and wide. Shortly after the death of this king, Carthage was refounded by Elissa (Dido), about B.C. 813, in consequence of a popular demonstration which deprived her of the throne in favor of Pygmalion. This 'new city' gradually diminished the importance of the old one; at least T. seems to have been weakened to such an extent by the emigration of its best elements that it disappears from history until the three great powers, Chaldæa, Assyria, and Egypt, by turns endeavored to make themselves masters of the Tyro-Phœnician coast, with its e. and w. trade. Shalmaneser, King of Assyria, reduced T., after a long siege; and the whole of Phœnicia, the most important places of which had already thrown off their allegiance to T., was rendered tributary to Assyria. During the Chaldæo-Egyptian struggle, T., again at the head of the country, sided with Egypt and was conquered by the Chaldæans. Once more the Phœnicians attempted to throw off the foreign yoke, and Nebuchadnezzar marched against them at the head of his armies. Having taken Jerusalem B.C. 587, he reduced the whole sea-coast, except T., which stood 13 years' siege by water and by land, ending, not in subjection, but only in an apparent submission, leaving the native sovereigns on their thrones, and their wealth and power untouched. In B.C. 538 Cyrus became master of Phœnicia, which at that time again was under Babylonian supremacy; and the hegemony was bestowed on Sidon. For a long time Phœnicia prospered under wise Persian rulers; but when Xerxes, in his Greek wars, had completely destroyed the Phœnician fleet, and exhausted nearly all her resources, the exasperated inhabitants rose once more, but only to be utterly crushed. Sidon, at the head of the revolution, was fired by its own inhabitants, and again T. resumed the lead (B.C. 350). Having refused to pay allegiance to Alexander the Great (after the battle at Issus), it was besieged by him B.C. 332, and fell after seven months' hard resistance. Alexander replaced the old inhabitants by new colonists, chiefly Carians; and though the city had been almost destroyed, it rose again after a brief period to wealth and power, and B.C. 315 was able to hold out 18 months against Antigonus. Under the Romans, Cleopatra received T. as a present from Antony; but the last trace of its independent existence was taken from it by Augustus. A Christian community had then been founded there. The trade and manufacture of T., aided by its exceptionally favorable naval position, gave it, even under Roman domin

ion, a high place among its sister cities; and once again, A.D. 193, it even took active part in the contest between Septimius Severus and Pescennius Niger, which, resulting in the success of Severus, brought back to it some of its ancient distinction. In St. Jerome's time it was again the most beautiful city of Phœnicia, and one of the most prosperous cities of the whole East. In the 7th c. it came under the dominion of the Saracens, and so remained until taken by the Crusaders; and in 1192 became the n. boundary of Christian territory in Palestine. It continued to flourish—still chiefly through its renowned manufacture of purple—until 1516, when the conquest of Selim I., together with the newly discovered route to Asia, by the Cape of Good Hope, put an end to its wealth and commerce, and almost to its existence. Although there has been a slight improvement in its prospects of late, the magnificent city of old still presents a scene of desolation and wretchedness. About 5,000 inhabitants now dwell in Sûr, among the ruins of its ancient glory, finding scanty livelihood in exports of tobacco, cotton, wool, and wood.

TYRIAN, a. *tĭr'ĭ-ăn:* pertaining to anc. *Tyre;* richly purple, as from the anc. Tyrian dye: N. a native of Tyre.

TYRNAU, *tĭr'now* (Magyar, *Nagy-Szombath*): town of Hungary, county of Ober-Neutra; on the river Trna, about 30 m. n.e. of Presburg. It has so many churches and convents that it has been nicknamed 'Little Rome.' There are manufactures of cloth, linen, woad, etc., and a general trade, especially in wine. 1635–1774 it possessed a univ., which was transferred (1774) to Pesth. T. is noted for a huge cask, holding twice as much as the Heidelberg tun.—Pop. 11,000.

TYRO, n. *tī'rō* [L. *tiro,* a young soldier: It. *tirone*]: a beginner in learning; one engaged in learning the mere rudiments; a novice; a person having an imperfect or slight knowledge of the subject. TY'RONISM, n. *-rō-nĭzm,* the state of being a tyro; novitiate.

TYROL, *tĭr'ol,* Ger. *tē-rōl'* (in German commonly spelled *Tirol;* not spoken of as *das T.,* though usually called among English-speaking people *The T.*): Austrian province (with Vorarlberg), the most westerly of the Austro-Hungarian monarchy; bordering n., w., and s. on Bavaria, Switzerland, and Italy; 11,280 sq. m., including Vorarlberg.—Pop. (1900) including Vorarlberg, 981,949.

Surface.—The T. may be regarded as an e. continuation of Switzerland. It is traversed from e. to w. by the great chain of the Alps, and is encircled by lofty ranges. It consists, however, almost entirely of three great valleys—(1) one running e. and w. n. of the Great Alps, and drained by the Inn; (2) one s. of the Alps, also running e. and w. and drained by upper tributaries of the Adige or Etsch; (3) one running s. from the middle of the second, and drained by the main stream of the Adige. These valleys are surrounded by a circuit of mountains. The n. valley is separated from Bavaria by the Algau Alps. The s. valley is bounded e. by the Trent Alps; w. by the

Ortler Alps, which, like protecting walls, extend s. into the plain of Lombardy. The main chain is crossed toward the centre of the T. by a deep depression, in which is the Brenner Pass (elevation 4,657 ft.)—lowest of the great passes of the Alps, and that over which runs the great commercial route between Italy and Germany.

The dialect and manners of the Bavarians prevail in the n. and middle valleys. The dialect and manners of Lombardy, on the other hand, have crept up the third valley to a boundary-line which rests on the mountains that bound the middle valley on the s. Hence the most important divisions of the T. are the German T. and the Italian T.—The German T. is divided into (1) the Oberinnthal, or the Upper Inn Valley; (2) the Unterinnthal, or the Lower Inn Valley; (3) the Vintschgau; (4) the Etsch district; (5) the Pusterthal—the last three belonging to the middle valley of the Tyrol. Beyond the geographical limits of the T., the Austrian province of the T. includes (6) the Vorarlberg, a dist. drained by streams which fall into the Lake of Constance, and in which a dialect is spoken resembling the dialects of German Switzerland; and (7) the Lienz district, on the Drave, in which the language is Austrian.—The Italian T. is divided into (1) a n. valley, that of Trent; (2) a s. valley, that of Roveredo; (3) the valley of the Sarca, or dist. of Riva, on Lake Garda.

Geology and Soils.—The rocks are chiefly crystalline Silurian and Secondary, with obtruding granites and traps. The chief mineral products are iron, rock-salt, worked near Innsbruck, and marble, quarried in the south. The Tertiary strata of the Swiss and Swabian plains are totally lacking; and only along the water-courses are found level tracts of recent formation. These tracts are the only parts of the country admitting cultivation by the plow, and they very seldom attain a width beyond half a mile.

Climate.—The loftiest mountains are—in the main chain of the Alps—the Gross Glockner (12,776 ft.), e. of the Brenner Pass, and Mt. Gebatsch (12,276 ft.), w. of it; and, in the Ortler chain, the Ortler Spitz (12,818 ft.). These mountains are covered with vast glaciers, extending, like those of Switzerland, far down into the valleys. Between 6,000 and 5,000 ft. of altitude, snow disappears in summer, and alpine plants and grass cover the hills, diversified here and there with stunted bushes. Into this region the herds are driven, as in Switzerland, during summer. Below 5,000 ft. fir-woods abound; potatoes and a few vegetables are cultivated, and houses permanently occupied make their appearance. The beech replaces the fir at 4,000 ft., and agriculture begins, the chief grains being rye and barley. Wheat is not cultivated with success higher than 2,000 ft. In the lower part of the s. valley, the temperature is highest, and, indeed, the climate is that of n. Italy; tobacco, the fig, the olive, and the mulberry being among the chief objects of cultivation. Out of every 100 acres of the T., 30 acres are inaccessible mountain tracts, 40 acres forests, 20 acres commons and meadows, and 10 acres corn-fields and gardens.

Industry.—The industries are not important. There are, however, glass and paper factories near Innsbruck; and carpets, linens, gloves, and straw hats are manufactured extensively for home consumption. Woodenware also is largely produced. The rearing of canaries was long a monopoly of the n. Tyrolese, who supplied all Europe with these birds. Exports from the T. consist of cattle, cheese, timber, wine, tobacco, silk, iron, and salt: imports are grain and manufactured goods. The transit-trade between Italy and Germany employs many of the inhabitants. Thousands migrate annually into neighboring countries, to sell their wood-wares, gloves, and carpets. Railways connect Innsbruck with Munich, and Botzen with Verona; and the section between Innsbruck and Botzen, over the Brenner Pass, opened 1867, completed the first railway-communication between Italy and Germany.

Inhabitants.—The N. or German Tyrolese bear to the S. or Italian the proportion of three to two; and the habits and language of the two populations resemble those of adjoining parts of Italy and Germany. In the T., according to the census, the inhabitants all are Rom. Catholics, except 358 Jews, 1,235 Protestants, 29 Greek Christians, and a few members of other sects. The Tyrolese have an independent national diet, meeting at Innsbruck, in which are represented all classes of the population, the clergy, the nobility, the people of the country, and those of the towns. There are, to some extent, separate administrative arrangements for the Italian districts. Education is now generally diffused, and one of the nine Austrian universities is at Innsbruck.

History.—The history of the T. is partly German, partly Italian. In early times the T. formed part of Rhætia, and was conquered by the Romans B.C. 15. Subsequently it was overrun by various German tribes; still later the s. valley fell to the share of the Lombards, the two n. valleys to the Bavarians. The latter valleys were divided into *gaus*, which ultimately became petty lordships, acknowledging the supremacy of the dukes of Bavaria. These lordships, however, in time came to be represented by two families who intermarried. Then the whole German T. was governed by one family of counts, whose paternal abode was the mountain fortress of Terioli, or Tyrol, near Meran. The last count (d. 1335) left one daughter, Margaret Maultasche. She bequeathed her rights to her cousins, the dukes of Austria, who thus acquired possession of the T. 1363. The Italian valley formed the bishopric of Trent. During the wars of Napoleon, the German T. was ceded to Bavaria, much to the discontent of the population, who were warmly attached to the House of Austria. They made a gallant resistance to the French 1809, under Andreas Hofer, but were defeated, and the Northern T. was not restored to Austria until the treaty of Paris 1814. The Southern T., which had been annexed to Italy, was restored to Austria in the following year. An application was made by the inhabitants of the Italian T., a few years ago, to the Austrian govt., to be

rendered entirely independent of the German inhabitants of the n. valleys—which, though leading to no important change, showed the desire of the Southern Tyrolese to be considered Italians rather than Germans; and it was believed that, on the event of a successful war for the recovery of Venice, the whole of the Southern T. would be transferred to the kingdom of Italy. This expectation has not been realized. By the treaty of peace between Austria and Italy, at the end of the war through which Venetia again became Italian, it is declared that the frontiers of the Venetian provinces ceded to Italy are the administrative frontiers of these provinces under the Austrian rule. Even the shores of Lake Garda remain Austrian. How long this arrangement will last, is not to be predicted. The trade of the Southern T. is entirely with the south, its wood and cattle being exchanged for the grain of Lombardy. Of late there has repeatedly been agitation in Italy for securing incorporation with that kingdom of what is called *Italia Irredenta* ('unredeemed Italy'), which includes, with Trieste and part of the Dalmatian sea-board, the *Trentino* and Southern Tyrol.

TYROLESE, a. *tĭr'ō-lēz:* pertaining to the *Tyrol*, in Austria: N. the natives of the Tyrol, or one of them. TYROLIENNE, n. *tĭr-ō'lē-ĕn*, a melody or song of the Tyrolese mountaineers, characterized by yodels, or frequent changes from the natural to the falsetto voice.

TYRONE, *tĭ-rōn':* borough in Blair co., Penn.; on Little Juniata river, and on the Pennsylvania railroad; 14 m. n.n.e. of Altoona, 131 m. e. of Pittsburgh. It is an important manufacturing place; has 6 churches, 1 national bank (cap. $75,000), 2 private banks, 1 daily and 2 weekly newspapers; bloom forge, railroad repair shops, and several planing-mills; and has large trade in iron products, flour, paper, leather, lumber, coal, lime, and furniture. —Pop. (1890) 4,705; (1900) 5,847; (1910) 7,176.

TYRONE, *tĭ-rōn'* (*Tir-owen*, 'Owen's country'): inland county of Ulster, Ireland; bounded n. by Londonderry, e. by Armagh and Lough Neagh, s. by Monaghan and Fermanagh, w. by Fermanagh and Donegal; greatest extent n. to s. 46 m., e. to w. 60; 1,260 sq. m., or 806,658 acres, of which 450,286 are arable, 311,867 uncultivated: of the arable land (1885), 237,528 acres were under crops. The surface, in general, is hilly, and often extremely picturesque, this county lying for the most part between the two mountainous districts which traverse Ulster from e. to w. The lakes, except Lough Neagh, are small. The principal rivers are the Blackwater, the Camowen, and the Ballinderry, the former two navigable. Railways connect the county with Dublin, Belfast, and the sea-coast at Dundalk. The geological structure is diversified. The n.w. mountains are chiefly mica-slate, with primitive limestone, and rise in Slieve Sawel 2,236 ft. Those on the n.e. are of greenstone, with granite and occasional red sandstone. The plain, of which Omagh is the centre, is a Tertiary formation, with irregular beds of lignite, red marl, and new

red sandstone; and between Dungannon and Stewartstown is a small coal-field. The rest of the plain belongs to the general limestone district. The climate is moist, and the low lands are often flooded. The soil of the plain is a fertile loam; that of the hilly districts, sandy or gravelly. There is large proportion of bog, whose turf supplies the chief fuel. Among the chief towns are Omagh, and Clogher, which give its name to the episcopal see. Tyrone, anciently known as the district of Hy-Briun and Hy-Fiachra, was in later Celtic times called Kinel Eogain, or Tir-owen, whence its modern name. See ULSTER. Pop. (1901) 150,567.

TYRONE, HUGH O'NEIL, 2d Earl of: Irish chieftain: b. about 1550; d. Rome 1616. He was the grandson of the first earl, and son of Baron of Dugannon. His early life was spent in England. After the murder of his brother in 1562, he returned to Ireland, succeeding to the barony. He was called 'The O'Neil,' and was the leader of the Irish insurrection against Elizabeth and English occupation. Both Connaught and Leinster soon joined the standard of the Ulstermen, and were met by an English army under the Earl of Essex and engaged in a war for supremacy. For some years Tyrone baffled the English army, but was overcome by Lord Mountjoy in 1603, in spite of the aid of Spain, and compelled to surrender. He was pardoned later and reinstated in his earldom. In 1607, being suspected of further intrigue, he fled to Brussels, and later to Rome, where he passed the remainder of his life and died in penury. Consult: Mechan, *Fate and Fortunes of Tyrone and Tyrconnel;* Gainsforde, *True Exemplary and Remarkable History of Hugh, Earl of Tyrone* (1619); Bagwell, *Ireland Under the Tudors.*

TYROSINE, n. *tĭr'ō-sĭn:* a substance formed along with leucine in certain stages of digestion.

TYROTOXICON: a ptomain, or poisonous animal alkaloid, formed as a result of the action of certain bacteria in milk and various milk products. It is the agent responsible for many of the cases of wholesale ice cream poisoning. The symptoms are nausea, vomiting, diarrhea, and other evidences of intense gastrointestinal irritation; dryness of the mucous membrane of the mouth and throat; a tingling sensation in the hands and feet, and dilatation of the pupils. The treatment consists in removal of any still unabsorbed portion of the poison by washing out the stomach and by purgatives, and in the administration of stimulants and later of nerve sedatives.

TYRRHENIAN SEA, *tĭr-rē'nĭ-an* (anc. *Tyrrhenum Mare*): that part of the Mediterranean Sea between the islands of Corsica, Sardinia, and Sicily, on the w., and the Italian peninsula, on the e.

TYRTÆUS, *tėr-tē'ŭs:* Greek poet, famed for his po-

litical elegies and marching-songs: about B.C. 650. His birthplace is not known: a probable conjecture makes him son of Archembrotus, of Aphidnæ, in Attica; another conjecture is that he was a Lacedæmonian; and a legend, the growth of later times, represents him as a lame schoolmaster, of mean family, whom the Athenians (ignorant of his lyric power, and jealous of Lacedæmonian domination in the Peloponnesus) sent to the Lacedæmonians, during the second Messenian war, as the most inefficient commander they could select. Tyrtæus rendered to the Lacedæmonians a kind of assistance which the Athenians little foresaw; for while by his elegies he stilled their dissensions at home, by his war-lyrics he so animated their courage in the field that they were finally triumphant in their conflict with the Messenians, whom they reduced to the condition of Helots. This success of his poems Tyrtæus lived to see, and must accordingly have lived till B.C. 668, the last year of the second Messenian war. The best edition of the text of Tyrtæus is that of Bergk in *Poetæ Lyrici Græci.*

TYTLER, *tīt'lėr,* ALEXANDER FRASER (Lord Woodhouselee): Scottish judge and historian: 1747, Oct. 15—1813, Jan. 5; b. Edinburgh; eldest son of William Tytler. He was educated in Edinburgh and at an excelcent school in Kensington; and was admitted to the Scottish bar 1770. He obtained, 1780, a professorship of history in the University of Edinburg; 1790, the office of judge-admiral of Scotland; and 1802 was raised to the bench of the court of session. His acquirements were varied, comprising literature and the fine arts. His writings include a biography of Henry Home, Lord Kames; a Dictionary of Decisions of the Court of Session (1778); and the work by which he is best known, *Elements of General History* (1801), which has been translated into most of the languages of Europe, and even into Hindustani.

TZANA, LAKE. See DEMBEA.

TZETZE, *tsĕt'sĕ:* a musical instrument of the guitar kind, formed of a long carved neck attached to a gourd. It has one string usually made of the tough fibre of a palm tree. The tzetze is of Abyssinian origin.

TZETZES, *tsĕt'sēz,* JOHANNES: a Byzantine author of the 12th century. His *Chiliades,* a very dull collection of 30,000 *political iambics,* whose theme is stories drawn from Greek history and mythology, has been edited by Kiessling (1826); his *Iliaca,* a résumé of Homer's *Iliad,* and kindred poems, by Bekker (1816). Commentaries on Homer, Hesior, the *Plutus* of Aristophanes, and Lycophron's *Alexandra* (edited by Müller, 1811), make up the remaining works of Tzetzes.

U

U, u: 21st letter and 5th vowel of the English alphabet; representing in that language three distinct sounds, as heard in *tube, tub,* and *full* (the *u* in *full* having the sound of *oo* in *book*). The last (as in *full*) is its primitive sound, which it had in Latin, and which it has preserved in German and Italian, but which is denoted in English oftener by *oo* (as in *good*). In *tube, u* is not considered to mark a pure vowel sound, but to be slightly aspirated, almost as if coalescing with a prefixed *y*—*tyub.* The sound heard in *tub* is characteristic of English; and, owing, perhaps, to the decided emphasis given to one syllable of a word at the expense of the rest, there is a tendency to allow the other vowels, *a, e, o,* when unaccented, to degenerate into this indistinct, stifled sound: *cavalry, sister, fashion,* are pronounced almost, if not altogether, as if written *cavulry, sistur, fashun.* This is the case especially with *o;* and in *o* the degeneracy is not confined to unaccented syllables; in a whole host of words, the accented *o* is exactly equivalent to *ŭ*—e.g., *come, money, among.* Perhaps a similar tendency in Latin may account for the prevalence of *u* in that language as compared with Greek—e.g., L. gen*u*s = Gr. geno*s*; vol*u*mus = boul*o*metha; spat*u*la = spat*a*le; scop*u*lus = skop*e*los. *U,* in Latin, sometimes goes into the still thinner sound of *i:* thus, *maxumus, caputis,* degenerated into *maximus, capitis.* Of the labial series of vowels (see LETTERS), *u* approaches nearest to the labial consonants—so much so that in Latin the vowel *u* and the consonant *v* were both denoted by the same character, *v,* of which *u* is only a later modification. In the middle ages the two characters were used indifferently whether as vowel or consonant; and it was not till the 16th century that the Dutch scholars fixed the use of the character *u* for the vowel, as distinct from *v.*

UAUPÉS, *wä-ō-pās′,* Colombia, a river rising in the eastern cordillera of the Colombian Andes, and flowing southeastward to the Rio Negro, which it joins in the northwestern corner of Brazil. Length about 700 m.

UBANGI, *ô-bäng′gē,* or MOBANGI: a river of Equatorial Africa, a tributary on the right bank of the Kongo, which it enters in lat. 0° 30′ s. It is the lower course of the Welle or Makua, which has its sources to the north of Lake Albert Nyanza. It is navigable, but there are difficult rapids at Zongo in 40° 20′ n. Throughout a

large part of its course down to its confluence with the Kongo it forms the boundary between the Kongo Free State and French Kongo.

UBEDA, *ô-vā′thâ:* town of Spain, Andalusia, in the modern province of Jaen; on an olive-clad slope in a cultivated plain, 26 m. n.e. of the town of Jaen. It contains some fine specimens of architecture, of which the chief is the cathedral. The industries are agriculture, and manufacture of porous vessels of red and white clay. Ubeda was built by the Moors, and under them it is said to have contained 70,000 inhabitants. Pop. 21,000.

UBIETY, n. *ū-bī′ĕ-tĭ* [mod. L. *ubietas*—from L. *ubi,* where]: in *philos.,* the presence of one thing with regard to another; the presence of a thing in place; state or condition of being in a place. According to the Schoolmen, ubiety might be: (1) Circumscriptive, as when all the parts of a body are answerable to the parts of space in which it is, and exclude any other body. (2) Definitive, as when a human soul is limited in its presence to the same place as a human body. (3) Repletive, as when God is present through every portion of space. This last form is sometimes called Ubiquity.

UBERTI, *ô-bĕr′tē,* Bonifazio, degli: Italian poet: b. Pisa about 1309; d. after 1368. He belonged to the noble family of Uberti, his grandfather having been a leader of the Florentine Ghibellines, and spent much of his time in exile. His *Dittamondo,* an unfinished didactic poem in the style of the *Divine Comedy* of Dante, placed him among the celebrated writers of the Italian renaissance. His lyrical poems received much later recognition.

UBIQUITOUS, a. *ū-bĭk′wĭ-tŭs* [F. *ubiquité,* ubiquity—from L. *ubīquĕ,* everywhere—from *ubi,* where]: existing or being everywhere; omnipresent. Ubiq′uitously, ad. *-lĭ.* Ubiq′uitary, a. *-wĭ-tėr-ĭ,* existing everywhere or in all places: N. one who exists everywhere. Ubiquita′rian, n. *-tā′rĭ-ăn,* one who teaches or believes that Christ as man is omnipresent; a Ubiquist. Ubiq′uity, n. *-wĭ-tĭ,* existence everywhere at the same time; omnipresence. Ubiquists, n. plu. *ū′bĭ-kwĭsts,* a Lutheran sect which arose about the middle of the 16th century, and which asserted the omnipresence of Christ's body, especially in the Eucharist.

UBI SUPRA, phrase, *ū′bī sū′prâ* [L., where above]: in the place or passage above mentioned; noting reference to some passage or page previously named or referred to.

UCAYALE, *ô-kī-ä′lä,* or Ucayali, Peru: a river flowing northward through the eastern part of the country, and joining in long. 73° 20′ w. the Amazon, of which it has sometimes been regarded as the true upper course. Its main headstream, the Apurimac, rises in the mountains 115 m. n.w. of Lake Titicaca, and another head-

stream, the Mataro, comes within 100 m. of the Pacific coast opposite Lima. The headstreams water the most populous districts of Peru, but the main course lies in the wild, forest-covered lowlands. It has a length of about 1,500 m., more than half of which is navigable for steamers.

UCCELLO, *ôt-chĕl'lō* (Paolo di Dono): Italian painter: b. Florence 1397; d. there 1479. He began as a goldsmith and worker in metal, assisting Lorenzo Ghiberti in the first pair of gates made by the latter for the Baptistery at Florence. His name of Uccello, 'Bird,' was given to him from the number of birds he kept as models for his pictures. Among the few works of his which have survived is a heroic sized equestrian figure of Sir John Hawkwood in the cathedral at Florence, painted in terra verde. In the Louvre there is a picture of his which is principally interesting from the fact that it contains life-sized portraits of Giotto, Donatello, Brunelleschi, Manetti, and Uccello himself.

UCKEWALLISTS, *ŭk-ĕ-wol'ĭsts:* a religious sect so denominated after the name of its founder, Uke Walles, native of Friesland, who in 1637 published his opinions regarding human salvation. He taught the doctrine of Universalism, and held that the period between the birth of Christ and the descent of the Holy Ghost was one of profound spiritual darkness and ignorance, during which the Jews were deprived of divine illumination, and that therefore their rejection of the Messiah and their complicity in the Crucifixion would not be visited with the uttermost penalties by divine justice. After the death of the founder of the sect, the Uckewallists became merged in the Mennonite sect.

UDAIPUR, *oo-dī-poor'*, India: (1) a northwestern town, capital of a native state of the same name in Rajputana, 70 m. w. of Gwalior. It is finely situated beside a lake 2,000 ft. above sea-level, contains a notable royal palace, and exports cotton, indigo, etc. Pop. (1901) 45,976. (2) The state (called also MEWAR), with an area of 12,670 sq.m., came under the protection of Great Britain in 1817, and the raja ranks highest in dignity among the Rajput chiefs. Pop. (1901) 1,021,664.

UDAL, a. *ô'dăl* [Icel. *odal;* Dan. *odel*, a hereditary estate (see ALLODIUM)]: Allodial (q.v.), still applied in *Orkney* and *Shetland* to land held under no feudal superior (see ALLODIUM; ALLODIAL TENURE). UDALLER, n. *ô'dăl-lėr*, or U'DALMAN, n. *-măn*, one who holds lands without any original charter and without a feudal superior. UDAL RIGHT, in the *law of Scotland*, that right in land which may be completed without charter and sasine by undisturbed possession provable by witnesses before an inquest.

UDALL, *yô'dal* (or WOOD'ALL), NICHOLAS: author: 1504-56; b. England. He was educated at Oxford, and

became fellow of Corpus Christi College there; was master of Eton School 1534-43, but was dismissed because in his zeal as a reformer he had removed silver images from the chapel. Thereafter he was successively vicar of Braintree, rector of Calbern, canon of Windsor; the year before his death he became master of Westminster School. He wrote several comedies in Latin and English, for use in school exhibitions; also some poems and school-books.

UDDER, n. *ŭd'dėr* [O. Dut. *uder;* Dan. *yver;* OHG. *utar;* Ger. *euter;* Icel. *jugr;* Gr. *outhar;* L. *uber,* an udder; Ir. and Gael. *uth,* an udder, a teat]: the milk-vessel of a female beast, with the dugs or paps, particularly in cows and other large quadrupeds. UD'DERED, a. *-dėrd,* furnished with udders. UD'DERLESS, a. *-lĕs,* deprived of a mother's milk.

UDINE, *ô'dē-nā:* city of n. Italy, Venetia, in the province of Udine, formerly called also the province of Friuli; in a fertile plain, about 75 m. n.e. of Venice by railway. It is a walled town, 4 m. in circumference, with wide, handsome streets and squares. The castle, on a hill in the midst of the city, was formerly the residence of the patriarchs of Aquileia, and is now the seat of the tribunals. The Antonini Palace is a work of the architect Palladius. Udine trades in silk, in copper utensils, and rosolio. There are leather, paper, and silk factories. Two miles from Udine is the village of Campoformio, where, 1797, the treaty between Bonaparte and Austria was signed, by which Venice was ceded to the latter. Pop. (1892) 36,000; (1901) 37,942.

UDINE, GIOVANNI DA: Italian painter: b. Udine, Northeast Italy, 1487; d. 1564. He was originally a pupil of Giorgione at Venice and there did much decorative work. Afterward he was associated with Raffael in frescoing the loggias of the Vatican and the Villa Farnesina. His work here completed, he returned to Udine in 1527 and painted many pictures for that city and neighboring places, executing the frescoes in Colloredo castle. He also furnished the designs for the stained glass windows in the Biblioteca Laurenziana at Florence.

UDOMETER, n. *ū-dŏm'ĕ-tėr* [L. *udus,* moist, wet; Gr. *metron,* a measure]: a water-measure; a rain-gauge.

UEBERWEG, *ü'bėr-vĕch,* FRIEDRICH: educator: 1826, Jan. 22—1871, June 7; b. Solingen, Prussia. He was educated in the universities of Göttingen and Berlin, was a tutor in the University of Bonn 1852-62, and was professor of philosophy in the University of Königsberg from 1862 till his death. His publications include: *System der Logik und Geschichte der logischen Lehren* (Bonn 1857, transl. London 1871); *Grundriss der Geschichte der Philosophie von Thales bis auf die Gegenwart* (3 vols. Berlin 1862-66); and *History of Philosophy* (transl. 2 vols., New York and London 1874).

UFA, *ô'fâ:* government of s.e. Russia; 47,112 sq.m.; formed 1865 out of the five n.w. districts of Orenburg, and separated from the present government of Orenburg by the s.w. branch of the Ural Mountains. See ORENBURG. Pop. 2,220,497.

UFA: city, capital of the government of Ufa; on right bank of the Biëlaia, or White river; was founded 1574, in the reign of Ivan IV. It contains 12 churches and 24 manufactories. The principal articles of trade are honey, wax, fat, furs, and skins. The Biëlaia, affluent of the Kama, and thus connected with the Volga, is here navigable for large ships. Pop. 49,961.

UGANDA, *ô-gân'dâ,* British East Africa: a British protectorate lying north of Lake Victoria Nyanza, and bounded on the north by the 5th parallel of north latitude, on the east by Lake Rudolph and the British East Africa Protectorate, on the south by German East Africa and Victoria Nyanza, and on the west by the Kongo Free State. It consists of the native kingdom of Uganda and several other districts with a total area of about 80,000 sq.m. The surface is diversified and well watered by headstreams of the Nile and of a number of lakes, including Rudolf, Victoria, Albert, and Albert Edward Nyanza, all of which lie partly within the protectorate. The flora and fauna are extremely rich and the soil very productive. Iron is abundant, and copper and gold are also found. The chief exports are ivory, timber, rubber, and cattle. The inhabitants are chiefly Bantu tribes. The Baganda tribes, the foremost among them, are civilized and Christians, with a well ordered native government under the supervision of a resident British commissioner. The capital is Mengo. Uganda came under British influence in 1890, and parts of the territory were for a time administered by the British East Africa Company. In 1894 the kingdom of Uganda was declared a British protectorate. Pop. 4,000,000.

UGOLINO, (DELLA GHERARDESCA), COUNT OF DONORATICO: Italian leader: b. Pisa about 1220; d. there 1289, March. He was one of the leading Ghibellines of Pisa (see GUELFS and GHIBELLINES), but, with the purpose of obtaining supreme power in the Pisan republic, entered into a conspiracy with Giovanni Visconti, head of the Guelfs. Banished by his own party, he was later allowed to return. When subsequently Pisa was threatened by the Genoese under Oberto Doria, Ugolino was appointed to command the defense. In the battle of Meloria, 1284, Aug. 6, he fled, thus deciding the contest overwhelmingly in favor of the Genoese. Treachery on this occasion has been generally imputed to him, but it has also been asserted that there is no adequate evidence for this view. However that may have been, the Pisans now granted Ugolino his opportunity, and by naming him capitano and podestá, at first for one year

and later for ten years, made him practically dictator of the state, Lucca and Florence joined Genoa for the spoliation of Pisa, but Ugolino, not without extensive cessions of territory, drew them from the alliance. More fully to obtain the confidence of the Guelfs, he made Nino Visconti associate-podestá. The latter, however, plotted with the Archbishop Ruggiero Ubaldini for Ugolino's overthrow. In July, 1288, he was besieged in the Palazzo del Popolo, and compelled to surrender. His death by starvation in prison was related by Dante, who, in a passage to which Ugolino owes most of his fame, places him above the Archbishop Ruggiero on the inward margin of the second division of the lowest (ninth) circle of the Inferno. The narrative was paraphrased by Chaucer (*Monk's Tale*), and translated by Medwin with the assistance of Shelley (1890).

UGH, interj. *ŭ* or *ŭch* with guttural *ch:* an expression of disgust or horror usually emphasized by a shudder.

UGLY, a. *ŭg'lĭ* [from the interjection *ugh,* expressing fear or horror: Icel. *ugga,* to fear, to doubt; *uggligr,* frightful, alarming: Goth. *ogan,* to fear: OE. *uglike* or *ugly,* used formerly in the sense of *horrible*]: displeasing to the eye; frightful; deformed; perverse of disposition; morally repulsive; *familiarly,* dangerous, as an *ugly* customer. UG'LINESS, n. *-nĕs,* total want of beauty; moral depravity. UG'LILY, ad. *-lĭ.*

UGOLINO DELLA GHERARDESCA, *ô-go-lē'no dĕl'lâ yā-râr-dĕs'kâ,* Count; Italian nobleman of the 12th century, known chiefly for his cruel death, which Dante has made memorable in his *Inferno.* Ugolino Della Gherardesca was for a time the head of the party of the Guelphs at Pisa; but a conspiracy, led by Archbishop Ubaldini, a Ghibelline leader, was formed against him, and with his sons and grandsons he was cast into the tower of Gualandi, and left to perish miserably by starvation. See GHERARDESCA.

UGRIANS, *ū'grĭ-anz,* or U'GRIAN FINNS: a division of the Finnic race, comprising the Voguls, who extend from the Ural Mountains e. to near the Obi river, in Siberia, and s. as far as Tobolsk; the Ostyaks, from the Voguls e. to the Venisei river, and from the Arctic circle to n. lat. 59°; and the Magyars of Hungary. Some ethnologists employ the term Ugrians as a general one to designate Finns, Laps, Permians, Ostyaks, etc. See FINNS; MONGOLS.

UGSOME, a. *ŭg'sŭm:* in *OE.* and *Scot.,* ugly. UG'SOMENESS, n. *-nĕs,* ugliness.

UHDE, FRITZ VON: German painter: b. Wolkenburg, kingdom of Saxony, 1848, May 22. For a while a student in the Dresden Academy, he left the institution to enter the Saxon army, in which he fought during the Franco-Prussian war and became captain of cavalry. He resumed art at Munich (1877), but soon went to Paris,

where he was a pupil of Munkácsy. After a period of genre-work in the old Dutch style, he turned to sacred subjects, abandoning modern artistic traditions in that field, and presenting his themes in a contemporary guise, somewhat after the fashion of the mediæval painters. This, together with a certain dulness of composition, long prevented the recognition in many ways due him. His pictures, however, found their way into many German galleries; he obtained several distinctions, including a Munich professorship; and his ideas influenced considerably the trend of German art. Among his works are: *Come Lord Jesus, Be Our Guest* (1885; National Gallery, Berlin); *The Last Supper* (1886); *The Sermon on the Mount* (1887); *The Organ-Grinder's Arrival* (1883); *Drum-Practice* (1883); and a *Last Supper* (1897) for the Stuttgart Museum.

UHL, *ool,* Edwin Fuller: American diplomat: b. Rush, N. Y., 1841, Aug. 14; d. Grand Rapids, Mich., 1901, May 17. He removed with his parents to Michigan in 1844, was graduated from the University of Michigan in 1862, and was admitted to the bar in 1864. He was prosecuting attorney for Washtenaw county in 1871-2, and in 1876 removed to Grand Rapids, where he engaged in law practice until his election as mayor of that city in 1890. He was re-elected in 1891, and in 1893 he was appointed assistant secretary of state. While *de facto* secretary of state during the illness of Secretary Gresham he was entrusted with the arbitration of boundary between Brazil and the Argentine Republic. He was ambassador to Germany in 1896-7 and then resumed his law practice.

UHLAN, or Ulan, n., *û'lăn* [F., a lancer—from Pol. *ulan;* Turk, *oglan,* a youth, a lad]: a light-cavalry soldier, wearing a semi-oriental uniform, armed with sabre, lance, and pistol, and employed chiefly in outpost duty, foraging, etc. Uhlans were introduced into n. Europe with the colonies of Tartars who established themselves in Poland and Lithuania. They were mounted on light active Tartar horses, and served mostly as 'irregulars.' Their lance was 5½ to 6½ ft. in length, and, like that of the modern 'lancers,' was attached to a stout leather thong or cord, which was fastened to the left shoulder, and passed round behind the back, so as to allow the lance to be couched under the right arm. Immediately below its point was attached a strip of gaudy-colored cloth, whose fluttering was intended to frighten the enemies' horses. The early dress was similar to that of the Turks, and the regiments, or *polks,* were distinguished from each other by their red, green, yellow, or blue uniforms. The Austrians and Prussians were the first to borrow this species of cavalry from the Poles. In 1734 an attempt was made by Marshal Saxe to introduce the Uhlans into France, and a 'polk' of 1,000 men was formed; but it was disbanded at Saxe's death. The Prus-

sian Uhlans won great renown in the Franco-German war of 1870-1 by their bravery and marvellous activity. The Prussians applied the term loosely, including all their light cavalry under the designation.

UHLAND, *ô'lânt*, JOHANN LUDWIG: German poet: 1787, Apr. 26—1862, Nov. 13; b. Tübingen. He studied at the university of his native city. He began to publish ballads and other lyrics in various periodicals, the first collection of which, under the title *Gedichte*, appeared 1815. To this he continually added through his life, and on these *Gedichte* his fame rests. Their popularity has been, and continues to be, as great as it is merited: the 60th edition was issued 1875. Other productions of Uhland are his admirable essays, *Ueber Walther von der Vogelweide* (Stuttg. 1822), and *Ueber den Mythus der nord. Sagenlehre vom Thor* (Stuttg. 1836); a masterly collection of old popular songs—*Alter hoch und niederdeutscher Volkslieder* (Stuttg. 1844-5); and two dramas, *Herzog Ernst von Schwaben* (Heidelb. 1817), and *Ludwig der Baier* (Berl. 1819). Uhland was a patriotic politician as well as a romantic poet. He entered the representative assembly of Würtemberg 1819 as deputy from Tübingen, and was an active member of the liberal party. He was also a delegate to the Frankfurt Assembly of 1848. He died at Tübingen. His pieces are full of spirit, imagination, and truth, finely picturesque in their sketches of nature and of character, and exquisite in their varied tones of feeling. Nothing, indeed, can surpass the brevity, vigor, and suggestive beauty of his ballads, in which a romantic sweetness of sentiment and a classic purity of style are happily combined. His poetry, in its delicate and noble tone, is a transcript of his personal character. Uhland is the acknowledged head of the 'Suabian School' of German poets. See Pfizer's *Uhland und Rückert* (Stuttg. 1837), and Mayer's *U.* (1867). The latest editions of Uhland's work have been by Prof. H. Fischer and Dr. Ludwig Fränkel. Longfellow, in *Hyperion*, translated some of Uhland's ballads into English; translations by Platt, Skeat, and Sanders also have appeared. Hewett's *Poems of Uhland* (New York 1896) is the best general edition of a student.

UIST, *wĭst*, NORTH and SOUTH: two islands of the Outer Hebrides; 15 to 18 m. w. of the Isle of Skye, from which they are separated by the Little Minch. Their e. coasts are deeply indented, while the w. coasts are almost unbroken.—NORTH UIST, between which and *South Uist* the island of Benbecula intervenes, is 18 m. long from w. to e., and 10 to 3 m. in breadth. The e. half is mostly a bog much cut up by lochs and watercourses. In the w. part, mostly hilly, there is a tract of uneven, low land, beautiful in certain seasons, and fertile. Pop. 3,000.—SOUTH UIST is 20 m. long, 7 m. broad. The e. district is upland; the w. is alluvial and productive. The people almost all are Roman Catholics. Pop. 3,540.

UITLANDER, n. *oyt'lăndėr* [Dutch *uitlander*, outsider]: in the South African Republic, a foreigner, especially one of the Afrikander, British, American, or European population. The uitlander, though the chief property owner, wealth-producer, and taxpayer in the state, is denied any voice in the government. See SOUTH AFRICAN REPUBLIC.

UJEIN, or UJJAIN, or OOJEIN, *ô-jīn':* one of the seven sacred cities of Hindustan, in Sindia's dominions, of which it was formerly the famous capital; on the right bank of the Sipra, 35 m. n.n.w. of Indore. It is much decayed. Ujein is surrounded by walls with round towers, is 6 m. in circumference, contains the grand palace of the head of the Sindia family, several mosques and mausoleums, an observatory, and an antique gate. Pop. 40,000.

UJIJI, *ô-jē'jē,* called also KAVELE: town in e. central Africa, on the e. shore of Lake Tanganyika; s. lat. 4° 55′, e. long. 30° 5′. It is an emporium for ivory, and was formerly a great slave-market. The population is largely floating, and consists of Arabs and representatives of many central African tribes. The natives live in rude huts, the Arabs in houses of sun-dried bricks. The climate is said to be unhealthful. Here Dr. Livingstone was found by Henry M. Stanley 1871, Oct. 28.

UKASE, *ū-kās':* a Russian term applied to edicts whether legislative or imperial. The term is not extended to the orders of the ministers. Ukases have the force of laws until annulled by subsequent edicts and many such orders are issued in the course of one reign. In 1827 Emperor Nicholas had the great mass of accumulated ukases collected, collated, and codified. This code, published in 48 volumes, with the modifications of subsequent ukases codified annually, forms the body of the Russian law, and is called the svod. Imperial orders for a day such as military orders during a campaign are called prikases.

UKIAH, *ū-kī'a:* city, county-seat of Mendocino co., Cal.; on the Russian river, and on the San Francisco and North Pacific railroad; about 120 m. n.w. of San Francisco. It was founded in 1857. It is in an agricultural and stock-raising region. The industries are connected chiefly with the cultivation and shipment of farm products, hops, and fruit. Considerable lumber and live-stock are shipped to other markets. The educational institutions are a high school opened in 1893, three public schools, and one parish school. It has one state bank, which has a capital of $250,000, and one private bank. Pop. 2,000.

UKRAINE, *ū'krān* or *oo-krān'* (from the Russian and Polish *ukraïna*, 'the frontier'): the local name for the extensive frontier region between Poland and Russia, now forming the Russian governments of Kief, Chernigof,

Podolsk, Kharkof, and Poltava. It is watered by the Dnieper, which intersects it in a winding course from north to south.

ULCER, n. *ŭl'sĕr* [F. *ulcère*—from L. *ulcus*, a sore; *ulcĕra*, sores: Sp. and It. *ulcera*]: a sore; a raw suppurating surface, usually covered with granulations. UL'CERATE, v. *-āt*, to affect with ulcers; to be formed into an ulcer. UL'CERATING, imp. UL'CERATED, pp.: ADJ. affected with ulcers; having the character of an ulcer. UL'CERA'TION, n. *-ā'shŭn* [F. *ulcération*—L.]: the process of forming into an ulcer; an ulcer. UL'CERATORY, a. *-ă-tĕr-ĭ*, that promotes ulceration. UL'CERED, a. *-sĕrd*, having become ulcerous; affected with an ulcer. UL'CEROUS, a. *-ŭs* [L. *ulcĕrōsus*, full of sores]: affected with an ulcer or with ulcers; of the nature of an ulcer; discharging pus or matter. UL'CEROUSLY, ad. *-lĭ*. UL'CEROUSNESS, n. *-nĕs*, the state of being ulcerous.—*Ulcers* may be classified according to the constitutional or specific disease with which they are associated, or according to the characters which they present. According to the first system, we speak of ulcers as healthy, inflammatory, varicose, syphilitic, etc.; while, according to the second, they are named irritable, chronic, sloughing, etc.

A *common, simple,* or *healthy ulcer* is such as is left after the separation of an accidental slough in a healthy person, and is merely a healthy granulating surface, tending to cicatrization. Its edges shelve gently down to the base, and are scarcely harder than the adjacent healthy skin. Its surface near the border is of purplish-blue tint where the young epidermis modifies the color of the healing granulations; and within this the granulations have a deeper hue than those at the centre, being most vascular where the cuticle is being chiefly developed. The discharge from such an ulcer is a creamy, yellowish pus, such as the older surgeons were wont to call 'laudable.' The only treatment required is a cleanliness and protection from infection by means of a few layers of bichloride or borated gauze, or sterilized absorbent cotton. When the granulations are too luxuriant, they must be touched with nitrate of silver, and dressed with dry lint. *Inflammatory ulcers* differ but little from the above-described common or healthy ulcers; they arise usually from some little injury, such as a blow or slight abrasion of the skin, which has subsequently become infected with the microbes of suppuration. Their most common seat is on the lower half of the leg or shin. The surface is red, and bleeds easily; the discharge is thin and watery; the edges irregular or shreddy; and the surrounding skin shows a red tinge, and is the seat of a hot and aching sensation. This ulcer occurs mostly in the infirm and old, the ill-fed and overworked. Hence constitutional treatment, good diet, and complete rest (with elevation of the limb) are demanded, in addition to an occlusive dressing, a water-dressing, or lead-lotion ap-

plied warm. *Senile ulcers* usually present very little discharge, exhibit granulations of rusty-red tint, and are surrounded by a dusky-red area. Nourishing food, wine, bark, and the mineral acids are here required, and opium in small repeated doses is often serviceable. The local treatment must be stimulating; and, in bad cases, strapping the leg with adhesive plaster may be necessary. *Strumous* or *scrofulous ulcers* occur usually as the consequence of scrofulous inflammation in the subcutaneous tissue or lymphatic glands. They are most frequent in the neck, groins, cheeks, scalp, and the neighborhood of the larger joints. The discharge is thin and of greenish-yellow tint. These ulcers are seldom very sensitive or painful. The constitutional treatment must be that recommended for scrofula or tuberculosis in general—life in the open air, tonics, and a generous diet. Iodine, in some form or other, is the best local application. A poultice of bruised and warmed sea-weed was formerly a popular domestic remedy; but there is probably nothing so efficacious as tincture of iodine diluted with water and applied three or four times a day (about 30 drops of the tincture may be added to an ounce of water, to begin with).—Among many other varieties of ulcers are the *Varicose, Indolent,* and *Sloughing Ulcers. Varicose ulcers* are connected with an enlarged or varicose state of the veins of the lower extremity, which, by interfering with the nutrition of the skin renders it especially liable to ulceration. See VARICOSE VEINS. *Chronic, indolent,* or *callous ulcer,* is seated usually in the lower half of the leg, and is generally of oval form, with its long axis parallel to that of the leg. Its base lies deep, and is flat, pale, or tawny and dusky, with very minute or no visible granulations. The margin is usually abrupt, or unequally shelving, and in its most characteristic form strictly overlaid with opaque, white, dense epidermis. The usual treatment is strapping firmly with adhesive plaster. The expediency of healing old ulcers of this kind was formerly questioned, for apoplexy, palsy, mania, and other serious diseases were popularly believed to follow the healing of such ulcers. For treatment of *Sloughing Ulcers,* see SYPHILIS and BUBO.

ULE, n. *ū'lē:* an elastic gum,, the produce of the ule-tree of Mexico; the caoutchouc-yielding trees, *Castillŏă elastĭca* and *C. Markhamĭāna.*

ULEABORG, Russia: a town in the grand duchy of Finland, capital of a government of the same name, at the mouth of the Uleå, on the n.e. shore of the Gulf of Bothnia, 498 m. by rail n. of Helsingfors. It has some manufactures, and carries on a trade in timber, butter, grain, etc. Pop. 16,300.

U'LEMA: the learned, knowing, or wise: collective name of the body of theologians and legists in Mohammedan countries: the word is Arabic and the plural form of *alim,* learned, wise. The Ulema constitute the legal

and judicial class and are interpreters of the Koran and of the laws derived therefrom: they are in Islam in a measure the counterpart of a hierarchy in a Christian monarchy, and are the principal check upon the irresponsible power of the sovereign. Every Mohammedan city has a body or Ulema, but the most renowned are the Ulema of Constantinople, of Mecca, and of the Azhaf University of Cairo. The Ulema of Turkey have the best organization, and enjoy many privileges and immunities. The classes of scholars and officials among the Ulema are: the Imâms, or readers of the public prayers in the mosques; the Mûftis or doctors of the law, who act either as advocates or as assessors in the courts; the Kâdis or Mollas, who are the regular judges; they are subordinate to two Chief Kâdis, one for the European, the other for the Asiatic provinces: over them all presides the Sheikh-ul-Islâm, spiritual head, under the caliph, of orthodox Mohammedanism and supreme judge of the Ottoman empire.

U'LEX. See FURZE.

ULEXITE, n. *ū'lĕks-īt:* a fibrous mineral, snow-white in color, consisting of hydrous borate of lime and soda.

ULFILAS, *ŭl'fĭ-las* (*Ulphilas, Wulfilas* = little wolf): celebrated translator of the Bible into Gothic: prob. 311-381; b. among the Goths n. of the Danube; of Marcomannian parentage. Consecrated bishop 341, he was severely persecuted by his heathen compatriots; and sought refuge 348, with a great number of new Christian converts, in Lower Mœsia, at the foot of the Hæmus, where he remained 33 years, dispatching his disciples as missionaries to the trans-Danubian Goths. In 388 he went to Constantinople (whither he had gone once before to assist at a council of the Arian party 360); and died there soon afterward. He was one of the chief lights of Arianism (see ARIUS), in the interest of which he exerted himself with energy. His political influence was great among his Gothic countrymen; and the contemporaneous Greek historians, no less than those writing soon after his death, are unanimous in attributing to him the largest share in the religious and social development of the Gothic population. His greatest work, however—rendering his name famous for all ages—is his Gothic translation of the Bible, a work by which he contrived both to fix the Gothic language and to perpetuate Christianity among the Gothic people. Familiar with Latin, Greek, and Gothic, and accustomed to write in each of them, he undertook to render the whole Bible, except the two warlike books of Samuel and Kings—whose influence he feared for his easily inflammable people—into a language which till then had, as far as we know, never been used for any important literary composition. Ulfilas is thus the father of Teutonic literature. Till the 9th century, this sacred and national work accompanied the Goths in all their migrations. But from that period

nothing was known of it beyond what was found stated in the ancient ecclesiastical accounts, until the end of the 16th century, when Arnold Mercator discovered in the Abbey of Werden the four Gospels of Ulfilas. Thence the MS. found its way to Prague, where it remained till 1648, when the Swedes took it as a spoil to Upsal, where it still remains in the University Library, under the name *Codex Argenteus.* In 1818 further remnants of the work—a great portion of the letters of St. Paul—were discovered by A. Mai and Castiglioni, on palimpsests, in a Lombardian monastery, which, added to a few minor fragments, bring the New Testament somewhat near completion. But hardly anything—except a few passages from Ezra and Nehemiah—has survived of the Old Testament. The immense importance of this sole Gothic remnant for Teutonic philology cannot be overrated. It is principally through it that the wonderfully fine structure of Gothic—a Germanic dialect of surpassing wealth and purity—has become known.

ULLAGE, n. *ŭl'lāj* [OF. *eullage,* the act of filling up; *eullier,* to fill up to the eye or bung-hole—from *oeil,* eye—from L. *oculus,* eye: Wedgwood, however, derives *eullier* from Prov. *oliar,* to anoint with oil, to fill up a cask, and says that 'in the s. of France, when the flask is nearly full, they add a little *oil* to prevent evaporation, so that *to oil* the flask is equivalent to filling it to the brim']: among *gaugers,* what a cask wants of being full; properly, the quantity required to fill it up.

ULLMANN, *ûl'man,* KARL: theologian: 1796, Mar. 15—1865, Jan. 12; b. Epfenbach, Baden. He studied theol. at Heidelberg and Tübingen; was intimate with Hegel, Daub, Schleiermacher, and Neander; became prof. in Heidelberg Univ. 1821; and in association with Umbreit founded the quarterly review *Theologische Studien und Kritiken* 1828. In 1829-36 he was a prof. in Halle Univ.; 1836 returned to Heidelberg; 1853 became bp. of the state church in Baden; and 1856-60 was pres. of the supreme ecclesiastical council. His teachings and writings had in view a reconciliation between Christianity and modern culture.

ULLMANNITE, n. *ŭl'măn-nīt* [after *Ullmann,* a Hessian chemist]: an ore of nickel and antimony, found chiefly in the copper mines of the Westerwald, of a bluish-gray color.

ULLOA, *ôl-yō'â,* FRANCISCO DE: maritime explorer: d. about 1540; b. Spain. He accompanied Cortes to Mexico, and showed great courage and capacity. On the return of Cortes from Spain, he placed Ulloa in command of a ship and 2 caravels, with orders to explore the Pacific coast as far n. as possible. Ulloa suffered shipwreck in the Gulf of California 1539, Aug.; but the following month pursued his exploration with the two caravels. He parted company 1540, Apr. 5, with those of his fellow-

voyagers who were in one of the caravels: they reached Santiago in safety. No trustworthy tidings of Ulloa were heard thereafter. The journal of his expedition, written by his clerk, Francisco Preciado, was preserved in the archives of Seville: it was translated into It. by Ramusio, and published in his *Viaggi;* and into Eng. by James Burney for his *History of the Discoveries in the South Sea.*

ULLSWATER, *ŭlz'waw-tėr:* after Windermere, the largest of the English 'Lakes;' between the counties of Cumberland and Westmoreland, 10 m. e. of Keswick; length 9 m.; breadth 1 m. Its scenery has none of the soft beauty of Windermere, but is rugged and grand. One of the chief features of the landscape is the lofty mountain Helvellyn, rising from the s.w. extremity of the lake.

ULM, *ûlm:* second city of Würtemberg, imperial fortress of the first class; on the left bank of the Danube, at the foot of the Swabian Alps; 45 m. s.e. of Stuttgart, 63 m. n.w. of Munich; lat. 49° 54′ n., long. 8° 8′ e. Till the war in 1866, Ulm was a stronghold of the Germanic Confederation, garrisoned by troops of Würtemberg, Austria, and Bavaria. It was long one of the most important imperial free cities. Ulm stands at the junction of the Blau with the Danube, which here becomes navigable. Two bridges unite the city with New Ulm, a village on the Bavarian side of the river. The streets are narrow, and the buildings old. The environs are flat. The cathedral, a Prot. church, is remarkable for architectural beauty, and is, next to the cathedral of Cologne, the largest church in Germany: it is 475 ft. in length, 165 in breadth, and 140 in height, the unfinished tower over the main entrance rising 320 ft. Its interior presents an aspect of massive dignity. The building was begun 1377, and finished 1494. There are good schools for the people, a gymnasium, high school, and trade school, a public library, an agricultural soc., and many charitable institutions. Leading industries are weaving linen, cotton, woolen, and mixed fabrics; bleaching, making paper, leather; beer-brewing; ship-building; book-printing; etc. Ulm is famed for ornamental pipe-bowls, and pastry called Ulmer bread. Around the city are extensive gardens, and asparagus especially is cultivated.

The Romans had a settlement at this important point. In the middle ages, at the height of its prosperity, it had a pop. of 60,000. In 1530 the city accepted the Reformation, and the majority of the people have since been Lutherans. In 1802 Ulm was attached to Bavaria, and became part of Würtemberg 1810.—Pop. (1900) 42,982.

ULMACEÆ, *ŭl-mā'sē-ē:* natural order of exogenous plants, regarded by some botanists as a sub-order of

Urticaceæ. They are trees or shrubs, having rough alternate leaves, each leaf with a pair of deciduous stipules. The flowers are small and in loose clusters. The perianth is small, membranous, bell-shaped, irregular; the stamens equal in number to the lobes of the perianth, and inserted into their base; the ovary superior. The fruit is 1-2-celled, nut-like, or compressed and winged. There are about 60 known species, natives of temperate parts of the n. hemisphere. See ELM; NETTLE-TREE; ZELKOUA.

ULMACEOUS, a. *ŭl-mā'shŭs* [L. *ulmus,* an elm]: pertaining to trees of the elm kind, ord. *Ulmācĕæ* (q.v.). ULMIC ACID, *ŭl'mĭk ăs'ĭd,* a vegetable acid exuding spontaneously from the elm. chestnut, oak, etc.; a constituent vegetable mold. UL'MIN, n. *-mĭn,* a dark-brown substance which exudes from the bark of the elm and several other trees (see HUMUS). UL'MOUS, a. *-mŭs,* applied to those dark substances in which ulmin is found. UL'MUS, n. *-mŭs,* a genus of hardly deciduous trees, including the elms.

UL'MANN, ALBERT: American author and stockbroker: b. New York 1861, July 2. He was graduated from the College of the City of New York in 1881, and has been a member of the New York Stock Exchange from 1899. He has published *Frederick Struther's Romance* (1889); *Chaperoned* (1894); *A Landmark History of New York* (1901); *New York's Historic Sites* (1902).

ULNA, n. *ŭl'nă* [L. *ulna;* Gr. *ōlĕnē,* the elbow, the arm: It. *ulna*]: in *anat.,* the larger of the two bones that form the forearm, or that portion between the wrist and elbow (see ARM). UL'NAR, a. *-nėr,* pertaining to the ulna or elbow.

ULODENDRON, n. *ū'lō-dĕn'drŏn* [Gr. *oulē,* a scar; *dendron,* a tree]: genus of fossil plants, which occur chiefly in the roof-shales of the coal-measures, based on trunks or stems often of considerable size, which are covered with small rhomboidal scars, as in Lepidodendron, formed by the bases of leaves or scales; but they differ remarkably from that genus in having a double series of large oval or circular markings, arranged linearly on opposite sides of the trunk. These markings are variously interpreted as representing the cicatrices produced by the bases of cones, by branches, or by leaf-stalks. This genus is, like many of the coal-fossils, extremely enigmatical; and it is difficult to determine its position in the vegetable kingdom: it is probably an ally of Lepidodendron, and that is known to be a vascular cryptogram nearly related to Lycopodium. Seven species are known.

ULOTRICHOUS, a. *ū-lŏt'rĭk-ŭs:* having crisp curly hair.

ULPIANUS, *ŭl-pĭ-ā′nŭs,* Domitius: Roman jurist, of Tyrian extraction, in the early part of the 3d c.: date of birth unknown; d. 228. He appears to have held juridical offices during the reigns of Septimius Severus and Caracalla, of which he was deprived by Elagabalus; but on the accession of Alexander Severus (222), he became the principal adviser of that emperor, who appointed him *scriniorum magister* (keeper of the public records), a *consiliarius* (public assessor), and *præfectus annonæ* (superintendent of the corn-market). He held also, during the reign of Alexander Severus, the important post of prefect of the Prætorian Guards. He was murdered in the palace, in a riot. Ulpianus was a voluminous and a valuable writer, being judicious in criticism and lucid in arrangement. In the *Digest* of Justinian there are no fewer than 2,462 excerpts from him, many of considerable length, and altogether forming about a third of the *Digest.* Unfortunately, the originals have almost entirely perished. The principal were: *Ad Edictum* (83 books), *Ad Sabinum* (51 books), *Ad Leges Juliam et Papiam* (20 books). The so-called *Fragmenta* of Ulpianus (pub. at Paris by Tilius 1549) consist of 29 titles, whence they are called in the Vatican MS. *Tituli ex Corpore Ulpiani.* The best ed. is Böcking's (Bonn 1836).

ULRIC, *ûl′rĭk,* St., Bishop of Augsburg: venerated as one of the Fathers of the German Church: about 890-970; b. Augsburg; son of a Count of Dillingen prominent in mediæval German history. He was educated in the Benedictine monastery of St. Gall (q.v.), in Switzerland; but appears to have been influenced chiefly by a remarkable female recluse, Wiborada, whose cell was in the vicinity of St. Gall. By her counsel he turned to the secular ministry, and received holy orders at Augsburg, where he became bp. 923. He bore an important part in the public affairs of the empire during the reign of Henry I. and his son Otho; and he was the guiding spirit of the several councils in Germany which in the 10th c. labored at the work of reform.—See the ancient *Vita S. Oudalrici Episcopi,* ed. by Mabillon, by the Bollandists, and recently by Dr. Pertz.

ULRICH, *ŭl′rĭk,* Charles Frederic: American artist: b. New York 1858, Oct. 18. He began the study of his profession at Cooper Institute and the National Academy. In 1879 he was awarded a medal at Munich, where he had studied under notable artists. His pictures include: *In the Land of Promise; The Glass Blowers; The Wood Engraver; The Carpenter; The Waifs; A Dutch Typesetter;* and *Washing of Feet in the Venice Cathedral.*

ULRICI, *ûl-rē'tsē*, HERMANN: German philosopher: 1806, Mar. 23—1884, Jan. 11; b. Pförten, in Lower Lusatia. He studied at Halle and Berlin, and, after a brief career as a lawyer, turned to literature and philosophy. In 1834 he was appointed prof. at Halle, where he remained till his death. His first work was his *Geschichte der Hellenischen Dichtkunst* (1835), followed by an ingenious essay on the dramatic art of Shakespeare (*Ueber Shakspeare's dramatische Kunst*, 1839; Eng. transl. 1846). Other works are his *Ueber Princip und Methode der Hegel'schen Philosophie* (1841); *Das Grundprincip der Philosophie* (1845–6); a *System der Logik* (1852); *Gott und die Natur* (1862; 2d ed. 1866), *Gott und der Mensch* (1866), in which U. develops a system of theistic philosophy, in opposition to materialism and in reaction from the anti-ethical pantheistic tendency of Hegelian idealism.

ULSTER, n. *ŭl'stĕr* [originally made in *Ulster*, a province of Ireland]: a convenient large loose overcoat, reaching to the feet, made of almost any material (originally of frieze), and worn by both sexes.

ULSTER, *ŭl'stĕr* (L. *Ultonia*): province of Ireland (q.v.), the most n. of the four provinces. It is divided into nine counties—Antrim, Armagh, Cavan, Donegal, Down, Fermanagh, Londonderry, Monaghan, and Tyrone (see these entries).

U., as a distinct territory, is of very ancient origin. It formed one of the five ancient divisions of Ireland, and was the seat of the Hy-Nialls or O'Neills, as well as of the lesser septs of O'Donnell, O'Cahan, O'Doherty, Maguire, MacMahon, etc. The n.e. portion, now co. Down, was early overrun by John de Courcy, later by Hugh de Lacy, and was the most permanent seat of English power in the north. The Antrim coast was occupied by a Celtic colony from Scotland and the Isles. In the n. and n.w. parts of the prov. the English made several attempts at a permanent settlement; their success, however, was merely nominal until the reigns of Elizabeth and of James I., when the Plantation of U. was effected, Londonderry (q.v.) being the chief seat of the colony. In U., the Celtic race, owing to the frequent and large infusions of a foreign element, is found in a much smaller proportion than in the three other provinces.—Pop. (1861) 1,910,108, of whom 963,687 were Rom. Catholics; (1871) 1,833,228, of whom 897,230 were Rom. Catholics; (1881) 1,739,542 (Protestants 907,014, Rom. C. 831,784); (1891) 1,617,877; (1901) 1,582,826.

UL'STER BADGE: distinguishing badge of the order of baronets in England—a sinister hand, erect, open, and couped at the wrist gules. It was the armorial ensign of the province of Ulster; and was assigned by James I. to the baronets in respect of the order having been intended for encouragement of plantations in that province.

UL'STER-CUS'TOM, n.: same as Tenant Right (q.v.).

UL'STER KING-AT-ARMS: chief heraldic officer of Ireland, appointed by the crown.—Such an official, called Ireland, existed in the time of Richard II.; but the office fell into abeyance; and the place was filled by appointment, as at present, by Edward VI., 1552. Ulster's office is in Dublin Castle.—See KING-AT-ARMS.

ULTERIOR, a. *ŭl-tē'rĭ-ĕr* [L. *ulterĭor*, further, on the further side: It. *ulteriore*]: more distant or remote; further; beyond something else either expressed or implied; in *geog.*, beyond the frontier.

ULTIMA, a. *ŭl'tĭ-mă* [L. *ultĭmus*, the furthest, the most distant]: most remote, furthest; final; last: N. in *gram.*, the last syllable of a word. UL'TIMATE, a. *-māt*, furthest; most remote; extreme; last of a series; conclusive; in *chem.*, that relates to absolute elements; the last into which a substance can be resolved; the opposite of *proximate*. UL'TIMATELY, ad. *-lĭ*. UL'TIMA'TUM, n. *-mā'tŭm*, the last offer; the final conditions or terms offered, as in diplomatic negotiations; the most favorable terms which a negotiator is prepared to offer, whose rejection will be considered as putting an end to negotiation; any definite final proposition; plu. UL'TIMA'TA, *-tă*, or UL'TIMA'TUMS, *-tŭmz*. ULTIMATE RATIO, in *math.*, that term of a ratio toward which a series tends, and which it does not pass. ULTIMA THULE (see THULE). ULTIMUS HÆRES, n. *ŭl'tĭ-mŭs hē'rēz* [L. *hærēs*, an heir]: the crown, as being the *last heir* to whom lands lapse through absence of proper heirs, or by forfeiture on account of the treason or felony of their original owners.

ULTIMO: usually contracted into ULT.: see under CURT.

ULTRA, a. and prefix, *ŭl'tră* [L. *ultra*, beyond]: beyond; on the other side; extreme; disposed to go beyond what is natural or proper: N. one who is extreme or radical in his opinions. UL TRAISM, n. *-ĭzm*, the principles of those who advocate extreme measures. ULTRA, n., or UL'TRAIST, n. *-ĭst*, one who advocates extreme measures.

ULTRAMARINE, a. *ŭl'tră-mă-rēn'* [L. *ultra*, beyond; *mărīnus*, marine—from *mărĕ*, the sea]: situated beyond the sea; foreign: N. a blue pigment of great beauty and permanence, prepared from the *lapis lazuli*, the finest specimens being brought from China and Further Asia—hence the name—now artificially prepared. The true U., from its costly nature, was used only by artists; the artificial U. is extensively used by house and ship painters, and is as cheap as it is beautiful. Many artists still insist upon having the true U., which is prepared as follows: fine lapis lazuli is broken into very small pieces, so as to enable the operator to see and pick out the small white portions which occur in it. Of the pieces of pure blue which remain, a pound-weight is then taken, and in a carefully covered crucible is heated to redness, and then thrown into cold water. It is next reduced to an impalpable powder, and mixed with six ounces of finely powdered resin, as light in color as it can be obtained, and two ounces each of spirits of turpentine, bees-wax and linseed-oil, all previously melted together. When these ingredi-

ents are thoroughly worked into a mass, portions of it are taken and kneaded in clean water; as long as any blue color is given out, this is continued, until every portion has been so treated. The blue water is then allowed to rest, and the sediment is collected and washed in water several times. The first washing removes a considerable quantity of dirt and other foreign matters, and is consequently rejected. The second, after being well agitated, is decanted; and from it is obtained the highest quality of the pigment. That which remains usually has two other washings, each of which gives a product of a less value than the operation which preceded it. The product obtained by sediment from each of the waters used is carefully dried, and is then employed either to make cakes for water-color painting, or a mixture for oil-painting, the value being about $5 per ounce.—ARTIFICIAL ULTRAMARINE.—The French chemists Clement and Desormes, in studying the curious process of obtaining U. from lapis lazuli by mixing it with resin, etc., were led to an analysis of the coloring matter that suggested to Guimet the idea of composing it artificially. In this he succeeded, and obtained for his discovery the prize of 6,000 francs offered by the *Société d'Encouragement des Arts*. Almost simultaneously, Gmelin in Tübingen gave an analysis and a synthetic process which also succeeded, and artificial U. is now a regular article of manufacture. Chemical skill, however, is necessary to success, and the manufacturers' formulas are very various—differing in the quantities of the ingredients, and the order of mixing them. The German manufacturers are very successful, and some of them have recently produced a fine green U.—The following formula is one of the simplest: 100 parts of finely washed kaolin or porcelain-clay (hydrated silicate of aluminium), 100 of carbonate of sodium, 60 of sulphur, and 12 of charcoal, are mixed, and exposed in a covered crucible to a bright heat for 3½ hours, when a green, unfused residue should be left. This residue, after being well washed and dried, must be mixed with a fifth of its weight of sulphur, and exposed in a thin layer to a gentle heat, so as just to burn off the sulphur. When this is accomplished, more sulphur must be added, and the washing repeated; and so on until the mass acquires a light-blue color, which is usually after the third roasting. In 1872 Fürstenau introduced improvements into the manufacture of U., showing how the blue tint could be produced in one calcination. There is reason to believe, from the experiments of Wilkens, that U. is composed of two portions—one of which is constant in its composition, and is the essential coloring matter, containing about 40 parts of silicic acid, 26 of aluminium, 13 of sulphur, and 21 of sodium, arranged as a mixture of two silicates of aluminium, sodium sulphite, and sodium sulphide—the blue coloring principle being a compound of the latter two; while the other portion differs from the former in resisting the action of hydrochloric acid, and contains a variable amount of sand, clay, oxide of iron, and sulphuric acid. U., if heated in the air, gradually

assumes a dull-green tint; and it is quickly decomposed by the action of the mineral acids and chlorine.

The term *Yellow Ultramarine* is sometimes given commercially to chromate of baryta, a yellow insoluble powder used as a pigment. ULTRAMARINE ASHES, the residue of lapis lazuli from which ultramarine has been extracted, producing a color varying from a dull gray to blue.

ULTRAMONTANE, a. *ŭl'tră-mŏn'tān* [L. *ultra*, beyond, *montānus*, pertaining to a mountain—from *mons* or *montem;* a mountain: F. *ultramontain:* It. *oltramontano*]: beyond the mountains—namely, the Alps—meaning their south side when used by the nations north of them: belonging to the Italian or extreme party in the Chh. of Rome, who hold that the pope is superior to general councils, and independent of their decrees; that he is considered to be the source of all jurisdiction in the church; consequently that it is through him, and not directly in virtue of their episcopal office, that the bishops derive their powers of 'jurisdiction,' as distinguished from those of 'order'—opposed to *Gallican* (see ORDERS: EPISCOPAL SYSTEM: GALLICAN CHURCH): N. a person who holds ultramontane opinions. UL'TRAMON'TANISM, n. *-tān-ĭzm*, the doctrines and tenets of those who hold extreme views as to the pope's rights and supremacy; the usurpation on the part of the church of rights and prerogatives proper to the state, the claim for the church and its ministers of a recognized right of interference in political, social, and worldly matters. UL'TRAMON'TANIST, n. *-tān-ĭst*, one who holds to ultramontanism.

ULTRAMUNDANE, a. *ŭl'tră-mŭn'dān* [L. *ultra*, beyond; *mundus*, the world]: beyond the world or the limits of our system.

UL'TRA-RED, a.: term applied to the rays beyond the red or low end of the spectrum. From these rays, invisible on account of the slowness of their vibrations, the greatest heating effects are obtained: see SPECTRUM.

UL'TRA-VI'OLET, a.: term applied to the rays beyond the violet or high end of the spectrum. The vibration of these rays is too rapid for vision, but they possess greater chemical activity than any others: see SPECTRUM.

ULTRA VIRES, *ŭl'trâ vī'rēz* [L., beyond powers]: in the law of corporations, a phrase meaning beyond the scope of a corporation's legal powers as defined by act of incorporation or by charter. Acts of a corporation that are U. V. are void in law; but should the corporation have received money or other value in consideration of the performance of an act U. V., the said money or value is recoverable in an appropriate action at law. A corporation may suffer deprivation of its charter by judgment of a court, as penalty for committing acts U. V. The general rule of law on the subject, as laid down by an authoritative writer, is that a corporation may lawfully engage in transactions expressly or impliedly authorized by its charter, read in a liberal sense; beyond these powers a corporation cannot legally or validly go.

ULTRONEOUS, a. *ŭl-trō'nē-ŭs* [L. *ultrōnĕus*, voluntary —from *ultro*, voluntarily]: of one's own accord; voluntary. ULTRO'NEOUSLY, ad. *-lĭ*.

ULUGH-BEG, *ō'lûg-bĕg*, MIRZA MOHAMMED BEN SHAH ROK, Prince of Samarkand: 1394–1449 (ruled 1447–49); grandson of Timûr (q.v.). He governed Western Turkestan as regent for his father, Shah Rokh, and succeeded to the throne on his father's death. Unfortunately, he was influenced by astrological indications to suspect the loyalty of his eldest son; and the injured prince rebelled, defeated and captured his father, and put him to death, thus fulfilling the prediction. U. is known to posterity as the founder of the observatory at Samarkand, as a patron of astronomers, and as himself a diligent observer. The astronomical tables which bear his name, compiled probably by himself and two assistants, have high reputation for accuracy, considering the time when they were compiled. The astronomical works of U. were in Arabic, afterward transl. into Persian, and thence the chronological portion of them rendered into Latin (Lond. 1650), by Greaves, who followed with a Latin version of the geographical part 1652. An ed. of U.'s catalogue of stars is in *Memoirs of the Royal Astronomical Society*, XIII.

ULULATE, v. *ŭl'ū-lāt* [L. *ululātus*, a howling; *ululo*, I howl]: to howl, as a dog or wolf. UL'ULATING, imp. UL'ULATED, pp. UL'ULA'TION, n. *-lā'shŭn*, a howl, as of a dog. A sound resembling such howling or barking has sometimes been uttered by human beings in a morbid mental state; the act is automatic, and is one of the modifications of hysteria.

UL'VA: see LAVER.

ULVERSTON, *ŭl'vĕr-ston:* small but important market-town and seaport of Lancashire, England; 23 m. by railway n.w. of Lancaster; in an extensive agricultural and mining district. It is the centre of commerce for Furness, and for parts of Cumberland and Westmoreland. It contains cotton and paper mills; manufactures linen, ropes, and woolen yarn; and has coasting-trade in iron and copper ores, limestones, grain, and gunpowder.—Pop. (1871) 7,607; (1881) 10,008; (1891) 9,948.

ULYSSES, *ū-lĭs'sēz:* Latin name of one of the heroes of the Trojan war, called Odysseus ('The Angry') in the poems of Homer. Different accounts are given of his parentage; but according to the oldest legend, the Homeric, he was son of Laertes, Prince of Ithaca (one of the Ionian Isles), and of Anticleia, daughter of Autolycus. According to a later legend, his father was the crafty Sisyphus; whence U. is called sometimes, by way of reproach, Sisyphides. He married Penelope (q.v.), by whom he became father of Telemachus. While a youth, he acquired reputation for courage, eloquence, and address. When the expedition against Troy (see TROY) was resolved on, Agamemnon visited Ithaca, and prevailed on U., though with difficulty, to take part in it. Later traditions,

or perhaps rather *inventions*, exaggerate his reluctance to leave his home; and represent him as feigning madness—an artifice which did not succeed. Before hostilities broke out, U., with Menelaus and Palamedes, was sent to Troy, to persuade the Trojans to give up Helen and her treasures; but diplomacy having failed, the Greek princes assembled their fleets in the port of Aulis, and sailed for Troy, U. bringing 12 ships. During the siege, U. performed important services for the Greeks. In prudence, ingenuity of resource, and *finesse*, he was foremost of the Hellenic chiefs, while in courage he was inferior to none. After the fall of Troy, the most interesting part of U.'s career begins, and forms the subject of the Homeric poem called the *Odyssey*. Several of his adventures are manifestly of eastern origin, and closely resemble those of *Sindbad the Sailor*. Setting sail for home, his ships were driven by a storm on the coast of Thrace, where he plundered the town of Ismarus, but lost a number of his crew. Having re-embarked, a north wind blew them across the Ægean and the Levant, to the country of the Lotophagi (the 'Lotus-eaters'), on the coasts of Libya, where the companions of U. ate of the wondrous fruit, and wished to rest forever. (Tennyson has a delicious rendering of this episode.) But their leader compelled them to leave the land 'in which it alway seemeth afternoon;' and sailing north again, they touched at the 'island of goats,' where U. left all his ships but one. Thence he proceeded westward, till he reached the 'island of the Cyclopes' (Sicily), where occurred the incident narrated under POLYPHEMUS (q.v.). The island of Æolus, and the city of the Læstrygones (a race of cannibals), whither fortune and the winds next carried the Hellenic chief, are supposed to be only names for particular parts of Sicily. Thence he sailed westward to the island of Ææa, inhabited by the sorceress Circe (q.v.). After a year's sojourn he departed, and, sailing still further west, crossed Oceanus, the 'ocean-stream,' into the country of the Cimmerians (q.v.), where darkness reigns perpetually. Here (following the advice of Circe) he descended into Hades (q.v.), and inquired of the blind seer Teiresias how he might return to his native land. Teiresias disclosed to U. the fact of the implacable enmity of Poseidon (Neptune), on account of his having blinded Polyphemus (who was a son of Poseidon by the nymph Thoosa); but encouraged him with the assurance that he would yet reach Ithaca in safety, if he would not meddle with the herds of Helios (the sun-god) in Thrinacia. U. now retraced his course, and once more visited Circe, the kindly sorceress, who forewarned him of the dangers he would yet have to encounter, and how to act. A west wind blew them past the perilous island of the Sirens (q.v.), to the coasts of Italy. In passing between Scylla and Charybdis, the monster that inhabited the first of these rocks devoured six of U.'s companions. He next came to Thrinacia, which he would fain have passed by; but his crew insisted on landing, and, in spite of their oath, killed some of the cattle of Helios while U. was asleep. The

anger of Zeus was kindled. When they had sailed away, a fierce storm arose, and Zeus sent forth a flash of lightning that destroyed the ship. Every one on board was drowned except U. himself, who, after many dangers, reached the island of Ogygia, the abode of the nymph Calypso, with whom he lived eight years. After his departure (which was commanded by Zeus, who had promised to Athene that U. should one day see Ithaca again—the poet always represents him as having a longing after his native isle), Poseidon persecuted him with a storm, and cast him on the shores of Scheria, the island of the Phæacians, in most forlorn condition. He was, however, kindly received by Nausicaa, daughter of King Alcinous; and having revealed his name at a feast, the monarch provided him with a ship to carry him home. U. was asleep when the vessel approached the coast of Ithaca; and the Phæacian sailors who had accompanied him bore the unconscious hero to the shore and left him there. When he awoke, he did not at first recognize where he was; but Athene, appearing, informed him, and of all that had happened to Penelope (q.v.) in his absence. Disguised as a beggar, he repaired to his own court, where he was recognized by his nurse, and, as Homer touchingly describes, by his old dog, Argus. Aided by Telemachus and the swine-herd Eumæus, he took vengeance on the insolent suitors of his wife, all of whom he slew. Homer records nothing more of U.'s history; but he makes Teiresias prophesy, in the 11th book, that the hero would meet a painless death in a happy old age. Another tradition says that he was slain by Telegonus, who was his son by Circe. Later poets, e.g., Virgil and Ovid, represent U. as a much less noble and valiant character than he appears in Homer; his wisdom and subtlety are changed into cunning and deceit; and instead of heroic courage he displays the spirit of a coward.

UM: Kafir or Zulu word signifying river, used as prefix in the names of most of the rivers on the s.e. coast of Africa, from the Great Kei, where the names of Hottentot origin appear to cease, as far to the n.e. as the Sofala coast, where the names Imhambane, Imhampoora, have the same prefix in a corrupted shape. Among the principal rivers on this coast bearing this prefix are the Umgazi, Umbashee, Umtata, Umzimvoobo, and Umzimculu, draining Independent Kaffraria; the Umcomanzi and Umtugela in the colony of Natal; and the Umfolusi, Umhlatoozi, and Umapoota, between Natal and Delagoa Bay. The Hottentot word Kei has the same meaning, and is still preserved in the Kei and Keiskamma rivers, the Keriega, Keisuga, and other streams on the e. coast of the Cape Colony.

UMÂ, *ô'mâ:* in the epic and Purânic mythology of India (see INDIA—*Religion*), one of the principal names of the consort of the god S'iva. Other names by which she is also usually designated are *Durgâ, Devî, Kâlî, Pârvatî, Bhavânî*, and there are many others less frequent. As a consort of S'iva (q.v.), her name seems to have a double

reference: in the earlier Vedic writings (see VEDA; UPANISHAD). It typifies the Brahma-science, or the knowledge of what is the nature of Brahman, the Supreme Soul; in the later mythology it appears as the type of destruction—the female energy of S'iva (see S'ÂKTAS). Though this double character of the consort of S'iva is not always discernible in the myths connected with her special designations, and though at a late period the popular creed viewed her far more as the type of destruction than as that of divine wisdom, yet the great books that treat of her extol her as also the personification of the highest knowledge. Thus, in the *Devîmâhâtmya* she is invoked, 'Thou art the seed of the universe, the highest Mâyâ; all this world is bewildered, but, descending on earth, thou art the cause of its final liberation: all the sciences are merely different modes of thyself.' She is invoked similarly in the *Mahâbhârata;* and in the *Harivans'a* Vishn'u addresses her as Saraswatî, goddess of eloquence and of sciences, etc.

The myths relating to this goddess, who is worshipped in various parts of India—particularly in Bengal (see S'ÂKTAS)—are in the great epic poems and Purân'as, in poetical works, such as the *Kumârasambhava* (see KÂLIDÂSA), and in modern popular compositions; but the text-book of her worshippers is the *Devîmâhâtmya,* or 'the majesty of Devî'—considered of especial holiness. In the *Râmâyan'a* she is spoken of as the daughter of Mount Himâlaya, and the sister of the Ganges. The myths recounting her amazing exploits, in the destruction of demons, are complex and innumerable (see VISHN'U: PURÂN'A: KÂRTTIKEYA: KANSA: ETC.). Annual festivals in various parts of India commemorate some of her victories. The worship of her as *Kâlî* (i.e., the Black), to which the narrative (of her victory over the demons Chan'd'a and Mun'd'a) has given rise, is considered by the Hindus themselves as embodying the principle of *tamas,* or darkness. She is represented as delighting in the slaughter of her foes, though capable of kindlier feelings to her friends. She is, however, styled the Black Goddess of Terror, frequenting cemeteries, and presiding over terrible sprites, fond of bloody sacrifices; and her worship taking place in the darkest night of the month (see THUG). With S'iva, she resides on Mount *Kailâsa,* the northern peak of the Himâlaya, or in her own palace on the Vindhya Mountains, where she amuses herself with hunting.

UMATILLA RIVER, Oregon: a southern affluent of the Columbia River, rising in the Blue Mountains, and after a west and northwesterly course of about 150 miles through Umatilla county uniting with the Columbia at Umatilla village on the boundary between Oregon and

Washington. Pendleton, the capital of Umatilla county, is the chief town along its course.

UMBAGOG, *ŭm'ba-gŏg*, LAKE: picturesque body of water in Oxford co., Me., and in Coos co., N. H., chiefly in the town of Erool, N. H.; 15 m. long, 1 m. to 10 m. wide, with outlet on the w. side into the Androscoggin river. It is reached by the Grand Trunk railroad from Gorham, N. H., and is widely known for its wild scenery and its abundance of fine trout.

UMBALLA, *ŭm-bâl'la*, or AMBALA, *âm-bâ'la:* walled town, cap. of the dist. of Umballa, in the division of Umballa, India; in the Punjab, 120 m. n.n.w. of Delhi. Under the walls of the fort are the British cantonments. Pop. of city 79,270. Pop. of *division* 1,729,043.

UMBEL, n. *ŭm'bĕl* [L. *umbella*, a sunshade, a parasol —from *umbra*, a shadow: It. *umbella:* F. *ombelle*]: in *bot.*, an inflorescence in which numerous stalked flowers arise from one point, as in the carrot or hemlock (see UMBELLIFERÆ). UM'BELLAR, a. *-lėr*, pertaining to or resembling an umbel. UM'BELLATE, a. *-āt*, or UM'BELLATED, a. bearing umbels; arranged in umbels; in *zool.*, having a number of nearly equal radii, all proceeding from a common centre. UM'BELLULE, n. *-lūl*, or UM'BELLET, n. *-lĕt*, a little or partial umbel. UM'BELLIF'EROUS, a. *lĭf'ėr-ŭs* [L. *fero*, I carry]: producing umbels; pertaining to the order of plants which have their flowers arranged in umbels. UMBELLIFER, n. *ŭm-bĕl'lĭ-fėr*, plant of the order UM'BELLIF'ERÆ, *-lĭf'ėr-ē*.

UMBELLIFERÆ, *ŭm-bĕl-lĭf'ėr-ē:* large and important nat. order of exogenous plants (the *Apiaceæ* of Lindley), containing more than 1,000 species, chiefly of the temperate regions of the n. hemisphere. The inflorescence of most plants of this order is peculiarly regular—a number of stalks, radiating from a common centre at the top of the stem or of a branch, each of which bears a flower at its extremity, thus forming an *Umbel* (q.v.). The umbel is often compounded, the primary stalks dividing in a radiated manner, and forming *secondary umbels* or *umbellules*. The flowers are generally small, white, rarely yellow, still more rarely red, though frequently tinged with pink at the edges; have a 5-toothed calyx, often obsolete, or nearly so; a corolla of five petals, inserted in the top of the calyx, and alternating with its teeth; five stamens, an inferior germen, and two styles. The fruit is peculiar, and consists of two one-seeded, unopening carpels, rarely fleshy, touching one another on the inner side, and there attached to a little column (the *carpophore*), their common axis. Each carpel has five primary and four secondary longitudinal ridges, more or less distinct; and beneath the separating furrows there are often linear receptacles of essential oil, called *vittæ*. The Umbelliferæ are mostly herbaceous plants, rarely shrubby, with divided or compound, rarely simple, leaves. They general-

ly abound in a resinous secretion, and a volatile oil, from which many of them derive poisonous and medicinal properties, more or less common to all parts of the plant, and often highly developed in the seeds. Acridity is their general characteristic. Some are pleasantly aromatic, others have a powerful and disagreeable smell. In the roots of some, especially when enlarged by cultivation, starch and sugar are secreted, so that they become useful for food, though the peculiar flavor of the essential oil is still retained. The systematic arrangement of the umbelliferæ has been found difficult by botanists. Sprengel, De Candolle, Koch, and others, have devoted much attention to this order. Of esculent-rooted Umbelliferæ, the carrot and parsnip are the best-known examples. Skirret, earth-nut, and arracacha are also of some value. The roots of *Anesorhiza Capensis* and *Fœniculum Capense* are used at the Cape of Good Hope as esculents. The roots of *Chærophyllum tuberosum*, or SHAM, are used in the Himalaya. The herbage of *Prangos pabularia* is so bland that it is much used in the temperate parts of the E. Indies for feeding cattle, and is made into hay for winter fodder. It is said, however, to be injurious to horses, though oxen and sheep are rapidly fattened by it. The blanched stems of celery, enlarged by cultivation, are a favorite salad, and those of Alexanders (*Smyrnium olusatrum*) were formerly used in the same way. The candied stalks of eryngo were once much esteemed, and those of angelica are still used. The leaves of parsley, chervil, fennel, etc., are used for flavoring. Lovage (*Levisticum officinale*) is sometimes cultivated as a salad plant. The seeds of anise, caraway, coriander, etc., are used as carminatives. Hemlock, water-hemlock, water-parsnip, fool's parsley, and many others are narcotic poisons—asafetida, galbanum, sagapenum, and opopanax are medicinal products of the plants of this order.

UMBER, n. *ŭm'bĕr* [L. *umbra*, shade, hue; or from *Umbrĭa*, a district of Italy whence said to have been first obtained]: a pigment of various shades of brown, occurring either naturally in veins and beds, or prepared artificially. Mineral umber is a variety of the iron ore called Hæmatite (q.v.); consists chiefly of oxide of iron, with some oxide of manganese, silica, alumina, and water; is soft and earthy, of a dark-brown color, has a conchoidal fracture, readily imbibes water, and falls to pieces like newly-burnt lime. When gently heated, so as to drive off the water of hydration, it is known as Raw Umber. When roasted, it becomes reddish brown in color, called Burnt Umber, and in that state is also used as a valuable color in house-painting, and in both oil and water-color pictures. It probably came originally from Umbria, in Italy, but is now found in Cyprus. The name *umber* is also applied (1) to a finely pulverized peat or brown-coal from Cologne, used as a pigment, but chiefly employed to adulterate snuff, etc.; (2) to the grayling, a

fish of the Salmon family; and (3) to an African bird (*Scopus umbretta*), of the family *Ardeidæ*, allied to the storks, but having a compressed bill with sharp ridge, the tip of the upper mandible hooked, and the nostrils situated in a furrow which extends the whole length of the bill. It is about the size of a crow, with umber-colored plumage, and the male has a large crest on the back of the head. UMBER, v. to darken with umber. UM'BERING, imp. UM'BERED, pp. *-bėrd:* ADJ. darkened as with umber. UM'BERY, a. *-bėr-ĭ*, brown like umber.

UMBILICAL, a. *ŭm-bĭl'ĭ-kăl* or *ŭm'bĭl-ĭ'kăl*, or UMBIL'IC, a. *-ĭk* [L. *umbĭlīcus*, akin to Gr. *omphălos*, the navel]: of or pertaining to the navel; of the shape of the navel. UMBIL'ICAL CORD, in *anat.*, a cord-like substance which extends from the placenta to the navel of the fetus. UMBIL'ICATE, a. *-ĭ-kāt*, or UMBIL'ICATED, a. [L. *umbĭlīcātus*, navel-shaped]: having a navel, or resembling one; in *bot.*, fixed to a stalk by a point in the centre; depressed in the middle like a navel. UMBILICUS, n. *ŭm'bĭl-ĭ'kŭs*, the central spot of the abdomen, marked by a depression; the navel; in *bot.*, the scar by which a seed is attached to the placenta, more commonly called the hilum: in *conch.*, the conical depression at the base of a univalve shell.

UMBIL'ICAL CORD: the navel-string or bond of communication between the fetus (which it enters at the umbilicus, or navel) and the placenta, which is attached to the inner surface of the maternal womb. It consists of the umbilical vein lying in the centre, and the two umbilical arteries winding from left to right round the vein. Contrary to the usual course, the vein conveys arterial blood to the fetus, and the arteries return venous blood to the placenta. These vessels are imbedded in a yellow gelatinous matter, known from its first describer (1659) as Wharton's gelatine or jelly. Nervous filaments have been traced into the cord; but the presence of lymphatics is doubtful. The whole is invested by a membrane (the Amnion—q.v.), and its ordinary length is about 20 in. As soon as a child is born, and its respiration fairly established, the umbilical cord is tied, and divided near the navel, which spontaneously closes, the fragment of attached cord becoming dry and falling away. See FŒTUS; PLACENTA.

UMBIL'ICAL CORD, in Botany: connecting link between the placenta of the ovary and the ovule, through which pass the vessels which nourish the ovule till it ripens into the seed. In some plants the ovules are so closely connected with the placenta that no umbilical cord can be said to exist; in others it is of considerable length.

UMBIL'ICAL HER'NIA: protrusion of intestine at the navel; most common shortly after birth; but sometimes in women who have been frequently pregnant. If reducible, and the patient an infant, the ordinary treatment is to place a firm pad over the navel, and to retain

it with strips of adhesive plaster or a bandage. Hernia in an infant, with or without treatment, is usually recovered from. In an adult, the ideal treatment, as for all hernias, is a radical surgical operation, the relaxed abdominal wall being sewed so that recurrence is unlikely. A bandage should, however, be worn for weeks or months. Operation becomes especially desirable when the hernia is irreducible, and imperative if the bowel is strangulated. If operation is not advisable on account of cardiac or other disease, and the hernia is not strangulated, a truss may be worn.

UMBLES, n. plu. *ŭm'blz* [L. *umbĭlīcus*, the navel (see NUMBLES)]: the entrails of a deer. UMBLE-PIE: see under HUMBLES.

UMBO, n. *ŭm'bō* [L. *umbo*, the boss of a shield]: the boss or protuberant part of a shield: in *bot.*, a conical protuberance on a surface: in *conch.*, the knob-like point of a bivalve shell, situated immediately above the hinge. UMBONES, n. plu. *ŭm'bō-nēz*. UM'BONATE, a. *-nāt*, or UM'BONATED, a. *-nā-tĕd*, knobbed in the centre; round, with a projecting point in the centre like the boss of an anc. shield. UMBONULATE, a *ŭm-bŏn'ū-lāt*, in *bot.*, having a termination like a small boss.

UMBRA, n. *ŭm-bră* [L. *umbra*, a shadow]: in *astron.*, the dark cone projected from a planet or satellite on the side opposite the sun.

UMBRAGE, n. *ŭm'brāj* [F. *ombrage*, a shade, jealousy, suspicion—from L. *umbratĭcus*, pertaining to shade or retirement—from *umbra*, a shade, a shadow]: shade or a shade; a screen of trees or foliage; hence, a feeling of being overshadowed; notion or suspicion of injury; offense. UMBRAGEOUS, a. *ŭm-brā'jŭs*, forming or yielding shade; shady; in *OE.*, suspicious; feeling umbrage. UMBRA'GEOUSNESS, n. *-nĕs*, the state or quality of being umbrageous.

UMBRAL, a. *ŭm'bral* [L. *umbra*]: in *geol.*, shady; term applied by Prof. H. D. Rogers to the 14th series of the Appalachian strata, corresponding in period to the Carboniferous limestone of Europe; maximum thickness in Penn. and Va., about 3,000 ft.; in the western states, about 1,000 feet.

UMBRELLA, n. *ŭm-brel'lă* [It. *ombralla*, an umbrella —from It. *ombra;* L. *umbra*, a shade: F. *ombrelle*, a sunshade]: a portable screen to be held above the head to shade from the sun, or to protect from rain, and which may be opened and shut at pleasure.—The *Umbrella* is of great antiquity. In the sculptures of Egypt, Nineveh, and Persepolis, umbrellas are frequently figured, and appear to have been, as now in the East, an attribute of royalty. In Greece and Rome its use was more general, and was probably continued in Italy from ancient times. At the beginning of the 17th century the umbrella seems

to have been little, if at all, known in England. Then it came into use as a luxurious sunshade; and in the reign of Queen Anne it had become common in London as a screen from the rain, but only for women. The first man who had the courage to carry an umbrella in the streets of London was Jonas Hanway, founder of the Magdalene Hospital, who had just returned from Persia, and was in poor health. Its use, however, was long regarded as a sign of infirmity or effeminacy. At first all umbrellas were imported—chiefly from India, Spain, and France; but now the manufacture of umbrellas has reached enormous proportions, both in Great Britain and in the United States. The umbrellas of China and Japan are of oiled paper, with bamboo ribs, stretchers, and handles.

UMBRELLA BIRD: South Amer. bird (*Cephalopterus ornatus*), about the size of a crow, with deep black plumage. The head is adorned with a large spreading crest with white shafts and glossy blue plumes, capable of being erected at will.

UMBREL'LA-TREE: magnolia found along the Alleghany Mountains from Tenn. to Ky., frequently grown for ornament. It is 30-40 ft. high, and has leaves 18-20 in. long and 8-10 in. wide, and white flowers 4-5 in. deep. Its name is derived from the clustering of the leaves at the ends of the flowering shoots. Foreign varieties are the ear-leafed, Guinea, and Queensland umbrella-trees.

UMBRIA, *ŭm'brĭ-a:* ancient division of Italy, west of Etruria, and north of the country of the Sabines, and usually described as extending from the Tiber east to the Adriatic. Tradition leads us to believe that at one time Umbrian territory extended from sea to sea, embracing much, if not all, of the country subsequently occupied by the Etruscans; but when the Umbrians first appear in history as a distinct people, we find them restricted to the ridges of the Apennines, the lowland region bordering on the Adriatic from the Æsis (mod. *Esino*) to the Rubicon being held by a race of Gallic invaders known as Senones. The most notable towns of Umbria were Narnia, Interamna, Acriculum, Spoletium, Mevenia, Fulginium, Assisium Tifernum, Nuceria, Camerinum, Sentinum, Urbinum, Sena Gallica, Fanum Fortunæ, and Ariminum.

The Umbrians were said by Pliny to be the oldest people of Italy—i.e., of Italian stock; and modern researches into their language (of which we possess one important memorial in the tables of Iguvium: see EUGUBINE TABLES) have demonstrated that they spoke a tongue closely allied to the Oscan (see OSCI), and the oldest of the Italian dialects. They stood faithfully by Rome in the dark years of the Hannibalic war, and were among the first to furnish Scipio with volunteers for invasion of Africa. They obtained the Roman franchise B.C. 90, and thenceforth disappear from history as a distinct people.

UMBRIAN, a. *ŭm'brĭ-ăn:* of or pertaining to *Umbrĭa,*

a district of central Italy, possessed by the Umbri at an early period B.C. UM'BRIANS, n. plu. the inhabitants of Umbria.

UMBRIERE, n. *ŭm'brĭ-ār* [Norm. F.—from OF. *umbre* —from L. *umbra,* a shade]: in *OE.,* the visor of a helmet; also UMBRERE.

UMBRIFEROUS, a. *ŭm-brĭf'ĕr-ŭs* [L. *umbra,* a shadow, *fero,* I bear]: casting or making a shade. UMBRIF'EROUSLY, *ad. -lĭ.*

UMLAUT, n. *ôm'lowt* [Ger.—from prefix *um-,* indicating alteration; *laut,* sound]: in *philol.,* a kind of assimilation of sounds; the change of the vowel in one syllable through the influence of one of the vowels *a, i, u,* in the syllable immediately following. It is a common feature in several Teutonic tongues. In German, umlaut is seen in the frequent change of the vowels *a. o. u.* to *ä, ö, ü.* In Anglo-Saxon it was also common. The change caused by *a* is called *a*-umlaut, and so of the other vowels.

UMNAK, *ôm'nâk*: an island of Alaska, one of the Fox Islands, a group of the Aleutian Islands. It is about 66 m. long and 10 m. wide. On the e. is Umnak Pass, 5 m. wide, which separates the island from Unalaska Island. The interior was explored, in 1757, by Nikiforoff, a Russian. The island is of volcanic origin, the highest point, Vsevidoff, is a volcano 8,000 feet high. Other peaks are also volcanoes. Just north, and connected with Umnak by a reef, is the volcanic island of Bogosloff, which was thrown above water in 1796. On Umnak are many hot springs, in one part the springs are boiling. Near Deep bay there are springs which vary in temperature. Fossil-wood, lignite, fire-clay, and different forms of lava are found on this island. The largest village, Nikolski, has about 300 inhabitants. The chief industries are catching seal and fishing.

UMPIRE, n. *ŭm'pīr* [EO. *nowmpere,* an arbiter: OF. *nompair,* uneven or odd in number: L. *non par,* not equal]: a third person chosen to decide a controversy left to arbitration, when the two arbitrators disagree, the decision or award of the umpire being final and binding on all parties concerned; a judge; a referee: V. to act as umpire. UMPIRAGE, n. *ŭm'pīr-āj,* the power, right, or authority of an umpire to decide; the decision of an umpire. UM'PIRESHIP, n. the office of an umpire—SYN. of 'umpire, n.': judge; arbitrator; referee; arbiter.

UMPQUA, *ŭmp'kwaw,* RIVER: important water-course in Douglas co., Oregon; rising by two forks in the Cascade Mountains, flowing n.w. through a fertile, mountain-skirted valley, and emptying into the Pacific Ocean about 20 m. n. of Empire City. The forks unite 8 m. below Roseburg, and the valley is noted for its wool products and placer gold-mining.

UMQUHILE, a. *ŭm'kwĭl* [AS. *hwilum,* for a time

once]: in *Scot.*, late; former; deceased: AD. some time ago; formerly; the same word as WHILOM, *hwī'lŏm.*

UN-, *ŭn* [AS. *un;* Ger. *un,* a privative or negative particle]: an inseparable prefix signifying (1) 'not,' the opposite of; and (2) 'back,' 'reversal,' 'annulment': *un,* signifying 'not,' may be used before almost any adjective, as in *un*fruitful, '*not* fruitful,' the opposite of fruitful; before nouns derived from adjectives, as in *un*fruitfulness, the opposite of fruitfulness; and before adverbs, as in *un*fruitfully: *un,* signifying 'back,' used before (transitive) verbs, denotes reversal of the action or annulment of the act, implied in the verb to which it is prefixed, as to *un*do, *un*bind, *un*say, etc.

In many cases both *in* and *un* are in good use as prefixes for the same word, and are used indifferently, some writers preferring *un* and others *in.*

UNABASED, a. *ŭn'ă-bāst':* not abased; not humbled.

UNABASHED, a. *ŭn'ă-băsht':* not confused with shame or by modesty.

UNABATED, a. *ŭn'ă-bā'tĕd:* not diminished in strength or violence. UN'ABA'TING, a. not diminishing in strength or violence.

UNABBREVIATED, a. *ŭn'ăb-brē'vĭ-ā-tĕd:* not abbreviated or shortened; uncurtailed.

UNABIDING, a. *ŭn'ă-bī'dĭng:* not abiding or permanent. UN'ABI'DINGLY, ad. UN'ABI'DINGNESS, n.

UNABLE, a. *ŭn-ā'bl:* not able; weak; without adequate knowledge or skill; incapable.

UNABOLISHED, a. *ŭn'ă-bŏl'ĭsht:* not abolished; remaining in force.

UNABRIDGED, a. *ŭn'ă-brĭjd':* not shortened.

UNABROGATED, a. *ŭn-ăb'rō-gā-tĕd:* not annulled.

UNABSOLVED, a. *ŭn'ăb-zŏlvd':* not acquitted or forgiven.

UNABSORBED, a. *ŭn'ăb-sŏrbd:* not imbibed or absorbed.

UNACCENTED, a. *ŭn'ăk-sĕnt'ĕd:* having no accent or force of the voice upon, as a syllable.

UNACCEPTABLE, a. *ŭn'ăk-sĕpt'ă-bl:* not acceptable; not pleasing. UN'ACCEPT'ED, a. not accepted; rejected.

UNACCOMMODATING, a. *ŭn'ăk-kŏm'mō-dā-tĭng:* not ready to oblige: uncompliant. UN'ACCOM'MODATED, a. unfurnished with external conveniences.

UNACCOMPANIED, n. *ŭn'ăk-kŭm'păn-ĭd:* not attended; having no appendages.

UNACCOMPLISHED, a. *ŭn'ăk-kŏm'plĭsht:* not accomplished; not finished; incomplete.

UNACCOUNTABLE, a. *ŭn'ăk-kownt'ă-bl:* not to be accounted for; inexplicable; irresponsible. UN'ACCOUNT'-

ABLY, ad. *-blĭ.* UN'ACCOUNT'ABIL'ITY, n. state of being unaccountable.

UNACCREDITED, a. *ŭn'ăk-krĕd'ĭt-ĕd:* not accredited; not received; not authorized.

UNACCUSTOMED, a. *ŭn'ăk-kŭs'tŭmd:* not accustomed; not habituated; new; not usual.

UNACHIEVABLE, a. *ŭn'ă-chēv'ă-bl:* that cannot be done. UN'ACHIEVED', a. not accomplished or performed.

UNACHING, a. *ŭn'āk'ĭng:* not feeling or causing pain.

UNACKNOWLEDGED, a. *ŭn'ăk-nŏl'ĕjd:* not recognized: not owned; not avowed.

UNACQUAINTED, a. *ŭn'ăk-kwānt'ĕd:* not having familiar knowledge; unusual. UN'ACQUAINT'ANCE, n. *-ăns,* ignorance; want of knowledge.

UNACQUIRED, a. *ŭn'ăk-kwīrd':* not gained or acquired.

UNACQUITTED, a. *ŭn'ăk-kwĭt'tĕd:* not acquitted.

UNACTED, a. *ŭn-ăkt'ĕd:* not put into execution; not acted, as a drama.

UNACTIVE, a. *ŭn-ăk'tĭv:* not brisk or lively; having no employment: *inactive* is the general spelling.

UNACTUATED, a. *ŭn-ăk'tū-ā-tĕd:* not moved.

UNADAPTED, a. *ŭn'ă-dăpt'ĕd:* not suited.

UNADDICTED, a. *ŭn'ăd-dĭkt'ĕd:* not given or devoted.

UNADDRESSED, a. *ŭn'ăd-drĕst:* not addressed.

UNADILLA, *ū-na-dĭl'a,* N. Y.: village in Otsego co.; on the Susquehanna river, and on the Delaware & Hudson R.R., about 45 m. n.e. of Binghamton and 93 m. s.w. of Albany. It is in an agricultural region. The chief manufacturing establishments are a flour mill, creameries, machine shop, foundry, and a wagon shop. The educational institutions are Union School and Academy, ranked as a high school, opened in 1893, and elementary and primary schools. There is one bank. Pop. (1900) 1,172.

UNADJUSTED, a. *ŭn'ăd-jŭst'ĕd:* not settled; not regulated; not liquidated.

UNADMIRED, a. *ŭn'ăd-mīrd':* not regarded with admiration.

UNADMONISHED, a. *ŭn'ăd-mŏn'ĭsht:* not cautioned.

UNADOPTED, a. *ŭn'ă-dŏpt'ĕd:* not received as one's own; not adopted or used.

UNADORED, a. *ŭn'ā-dōrd':* not worshipped.

UNADORNED, a. *ŭn'ă-dawrnd':* not adorned or decorated; not embellished.

UNADULTERATE, a. *ŭn'ă-dŭl'tėr-āt,* or UN'ADUL'TERATED, a. *-dŭl'tėr-ātĕd:* genuine; pure; not spoiled by admixture or contact.

UNADVENTUROUS, a. *ŭn'ăd-vĕn'tū-rŭs:* not adventurous.

UNADVISABLE, a. *ŭn'ăd-vī'ză-bl:* not advisable; not expedient. UN'ADVISED', a. not prudent; not discreet; done without due thought; rash. UN'ADVI'SEDLY, ad. UN'ADVI'SEDNESS, n. imprudence; rashness.

UNAFFECTED, a. *ŭn'ăf-fĕkt'd:* plain; natural; not labored or artificial; sincere; not moved; not influenced. UN'AFFECT'EDLY, ad. UN'AFFECT'EDNESS, n. the state of being unaffected. UN'AFFECT'ING, a. not adapted to move the passions. UN'AFFEC'TIONATE, a. *-shŭn-āt,* wanting affection.

UNAFFIRMED, a. *ŭn'ăf-fėrmd':* not affirmed.

UNAFFLICTED, a. *ŭn'ăf-flĭkt'ĕd:* free from trouble or distress.

UNAFFRIGHTED, a. *ŭn'ăf-frīt'ĕd:* not frightened or terrified.

UNAGITATED, a. *ŭn-ăj'ĭ-tā-tĕd:* not disturbed; calm.

UNAGREEABLE, a. *ŭn'ă-grē'ă-bl:* in *OE.,* inconsistent; unsuitable.

UNAIDED, a. *ŭn-ād'ĕd:* not assisted. UNAID'ABLE, a. *-ă-bl,* incapable of being aided.

UNAIMING, a. *ŭn-ām'ĭng:* having no particular aim or direction.

UNAKA MOUNTAINS, *ū'na-ka:* s.w. extremity of the Great Smoky Mountains, between Tenn. and N. C.; they extend from the Tennessee river to the Hiawassee river.

UNALARMED, a. *ŭn'ă-lârmd':* not disturbed with fear. UN'ALARM'ING, a. not alarming.

UNALASKA, *ô-na-lăs'ka,* formerly written UNALASHKA and OONALASH'KA: island in the North Pacific, belonging to the Fox group of the Aleutian Islands; lot. 55° 52′ n., long. 166° 32′ w. It is 75 m. long, and in some parts 20 m. broad, and has a rugged mountainous surface. It is an important fur-trading centre, and is a point of call for whalers, etc., for all necessary supplies except wood.—Pop. about 1,000.

UNALLAYED, a. *ŭn'al-lād:* not appeased or quieted.

UNALLEVIATED, a. *ŭn'ăl-lē'vi-ā-tĕd:* not mitigated.

UNALLIED, a. *ŭn'ăl-līd':* having no connection as by nature, marriage, or treaty; having no powerful relation.

UNALLOYED, a. *ŭn'al-loyd':* not reduced or debased by foreign admixture; unmixed.

UNALTERABLE, a. *ŭn-awl'tėr-ă-bl:* incapable of alteration; unchangeable; immutable. UNAL'TERED, a. not altered or changed. UNAL'TERABLY, ad. UNAL'TERABLENES, or UNALTERABIL'ITY, n. state of being unalterable.

UNAMAZED, a. *ŭn'ă-māzd':* not astonished; free from astonishment.

UNAMBIGUOUS, a. *ŭn'ăm-bĭg'ū-ŭs:* not obscure;

plain, clear; not of doubtful meaning. UN'AMBIG'UOUSLY, ad. UN'AMBIG'UOUSNESS, n. the state or quality of being unambiguous.

UNAMBITIOUS, a. *ŭn'ăm-bĭsh'ŭs:* free from ambition; not aspiring; not ostentatious. UN'AMBI'TIOUSLY, ad.

UNAMENABLE, a. *ŭn'ă-mē'nă-bl:* not amenable or responsible.

UNAMIABLE, a. *ŭn-ā'mĭ-ă-bl:* not adapted to gain affection. UNA'MIABLENESS, n. the state or quality of being unamiable; repulsiveness.

UNANCHORED, a. *ŭn-ăng'kėrd:* not anchored.

UNANELED, a. *ŭn'ă-nēld'* [see ANELE]: in *OE.*, not having received extreme unction.

UNANIMATED, a. *ŭn-ăn'ĭ-mā-tĕd:* not possessed of life; dull; not enlivened.

UNANIMOUS, a. *ū-năn'ĭ-mŭs* [L. *unus*, one; *anĭmus*, mind: F. *unanime*, unanimous]: being of one mind; agreeing in opinion. UNAN'IMOUSLY, ad. *-lĭ.* UNANIMITY, n. *ū'nă-nĭm'ĭ-tĭ*, or UNAN'IMOUSNESS, n. *-nĕs*, state of being unanimous; agreement in opinion or determination.

UNANNEALED, a. *ūn'ăn-nēld:* not tempered by heat; suddenly cooled.

UNANNEXED, a. *ūn'ăn-nĕkst':* not annexed or joined.

UNANNOUNCED, a. *ŭn'ăn-nownst':* not announced.

UNANOINTED, a. *ŭn'ă-noynt'ed:* not anointed; not having received extreme unction.

UNANSWERABLE, a. *ŭn-ăn'sėr-ă-bl:* that cannot be refuted or answered satisfactorily. UNAN'SWERABLY, ad. UNAN'SWERABLENESS, n., or UNAN'SWERABIL'ITY, n. *-bĭl'ĭ-tĭ*, the state or quality of being unanswerable. UNAN'SWERED, a. not answered; not confuted; not opposed by a reply.

UNAPOSTOLIC, a. *ŭn-ăp'ŏs-tŏl'ĭk*, or UNAP'OSTOL'ICAL, a. *-ĭ-kăl:* not agreeable to apostolic usage; without apostolic authority.

UNAPPALLED, a. *ŭn'ăp-pawld:* not daunted.

UNAPPARELLED, a. *ŭn'ăp-păr'ėld:* not dressed; not clothed.

UNAPPARENT, a. *ŭn'ăp-pâr'ĕnt:* not apparent; obscure; not visible.

UNAPPEALABLE, a. *ŭn'ăp-pēl'ă-bl:* admitting no appeal.

UNAPPEASABLE, a. *ŭn'ăp-pēz'ă-bl:* not to be pacified; implacable. UN'APPEASED', a. not pacified.

UNAPPLAUDED, a. *ŭn'ăp-plawd'ĕd:* not applauded; not praised.

UNAPPLIED, a. *ŭn'ăp-plīd':* not applied; not used according to the intention.

UNAPPRECIATED, a. *ŭn'ăp-prē'shĭ-ā-tĕd:* not duly estimated or valued.

UNAPPREHENSIVE, a. *ŭn'ăp-prĕ-hĕn'sĭv:* not suspecting; unsuspicious.

UNAPPRISED, a. *ŭn'ăp-prīzd':* not previously informed.

UNAPPROACHABLE, a. *ŭn'ăp-prōch'ă-bl:* that cannot be approached; inaccessible. UN'APPROACH'ABLY, ad. UN'APPROACHED', a. not to be approached; inaccessible.

UNAPPROPRIATED, a. *ŭn'ăp-prō'prĭ-ā-tĕd:* not applied to any specific object; not granted or given, as to a person or company.

UNAPPROVED, a. *ŭn'ăp-prôvd':* not having received approbation; not approved. UN'APPRO'VING, a. not approving.

UNAPT, a. *ŭn-ăpt':* not apt; not qualified; not suitable; dull; unready. UNAPT'LY, ad. UNAPT'NESS, n. the state of being dull or unready to learn; unfitness; want of apprehension; unreadiness.

UNARGUED, a. *ŭn-âr'gūd:* not discussed; in *OE.*, not censured.

UNARM, v. *ŭn-ârm':* to strip of armor; to deprive of arms. UNARMED, a. *ŭn-ârmd',* without arms; not equipped: in *bot.,* not furnished with scales or prickles, or the like.

UNARRANGED, a. *ŭn'ăr-rānjd':* not arranged or disposed in order.

UNARRAYED, a. *ŭn'ăr-rād':* not dressed; not disposed in order.

UNARRESTED, a. *ŭn'ăr-rĕst'ĕd:* not stopped; not apprehended.

UNARTICULATED, a. *ŭn'âr-tĭk'ū-lā-tĕd:* not articulated or distinctly pronounced.

UNASCERTAINABLE, a. *ŭn-ăs'sėr-tān'ă-bl:* that cannot be ascertained or reduced to certainty. UNAS'CERTAINED', a. not known with certainty.

UNASHAMED, a. *ŭn'ă-shāmd':* not ashamed.

UNASKED, a. *ŭn-ăskt':* not sought by entreaty; unsolicited.

UNASPIRING, a. *ŭn'ăs-pī'rĭng:* not aspiring or ambitious. UN'ASPI'RINGLY, ad.

UNASSAILABLE, a. *ŭn'ăs-sāl'ă-bl:* that cannot be assailed or attacked. UN'ASSAILED', a. not attacked.

UNASSAULTED, a. *ŭn'ăs-sawlt'ĕd:* not attacked with violence.

UNASSAYED, a. *ŭn'ăs-sād':* not attempted; not tried or tested—applied to metals.

UNASSERTED, a. *ŭn'ăs-sĕrt'ĕd:* not affirmed or vindicated.

UNASSESSED, a. *ŭn'ăs-sĕst':* not assessed or rated.

UNASSIGNABLE, a. *ŭn'ăs-sīn'ă-bl:* that cannot be transferred by assignment or indorsement. UN'ASSIGNED', a. not transferred; not declared.

UNASSIMILATED, a. *ŭn'ăs-sĭm'ĭ-lā-tĕd:* not made to resemble; not united with or actually made a part; not made into the fluids or solids of the body, as food.

UNASSISTED, a. *ŭn'ăs-sĭst'ĕd:* not aided or helped. UN'ASSIST'ING, a. giving no help.

UNASSOCIATED, a. *ŭn'ăs-sō'shĭ-ā-tĕd:* not united with or in company with.

UNASSUMED, a. *ŭn'ăs-sūmd':* not assumed. UN'ASSU'MING, a. not bold or forward; modest; not arrogant.

UNASSURED, a. *ŭn'ă-shôrd':* not bold or confident; not insured.

UNATONED, a. *ŭn'ă-tōnd':* not expiated. UN'ATO'NABLE, a. not to be appeased; in *OE.*, not reconcilable.

UNATTACHED, a. *ŭn'ăt-tăcht':* not arrested; not closely adhering; not united by affection; having no fixed interest; not attached to any particular regiment, as an army officer.

UNATTACKED, a. *ŭn'ăt-tăkt':* not attacked or assaulted.

UNATTAINABLE, a. *ŭn'ăt-tān'ă-bl:* not to be obtained; being out of reach. UN'ATTAINED', a. not attained or reached.

UNATTEMPTED, a. *ŭn'ăt-tĕm'tĕd:* not tried or essayed.

UNATTENDED, a. *ŭn'ăt-tĕnd'ĕd:* not attended; not accompanied; without attendants.

UNATTESTED, a. *ŭn'ăt-tĕst'ĕd:* not attested; without witness.

UNATTIRED, a. *ŭn'ăt-tīrd':* not attired or adorned.

UNATTRACTED, a. *ŭn'ăt-trăk'tĕd:* not affected or influenced, as by attraction. UN'ATTRAC'TIVE, a. not attractive or prepossessing.

UNAUTHENTICATED, a. *ŭn'aw-thĕn'tĭ-kā-tĕd:* not proved to be genuine; not made certain by authority.

UNAUTHORIZED, a. *ŭn-aw'thŏr-īzd:* not warranted by proper authority.

UNAVAILABLE, a. *ŭn'ă-vāl'ă-bl:* not available; not having sufficient power to produce the intended effect; useless; ineffectual; vain. UN'AVAIL'ING, a. not having the desired effect; useless.

UNAVENGED, a. *ŭn'ă-vĕnjd':* not avenged; not having obtained satisfaction; not punished.

UNAVERTED, a. *ŭn'ă-vėrt'ĕd:* not turned away.

UNA VOCE, phrase, *ū'nâ vō'sē* [L.]: with one voice; unanimously.

UNAVOIDABLE, a. *ŭn'ă-voyd'ă-bl:* that cannot be shunned; certain; inevitable. UN'AVOID'ABLY, ad. UN'AVOID'ABLENESS, n.

UNAVOWED, a. *ŭn'ă-vowd':* not acknowledged.

UNAWAKED, a. *ŭn'ă-wākt',* or UN'AWAK'ENED, a. *-wāk'nd:* not roused from sleep; not roused from spiritual or mental slumber or torpidity.

UNAWARE, a. *ŭn'ă-wär':* not aware; inattentive; unexpectant. UN'AWARE', or UN'AWARES', ad. *-wärz',* suddenly; unexpectedly; without thought; without premeditation.

UNAWED, a. *ŭn-awd':* not restrained by fear.

UNBACKED, a. *ŭn-băkt':* that has never been mounted or taught to bear a rider, as a horse; unsupported.

UNBAFFLED, a. *ŭn-băf'fld:* not defeated or confounded.

UNBAKED, a. *ŭn-bākt':* not baked or made ready for food.

UNBALANCED, a. *ŭn-băl'ănst:* not poised; not adjusted; not settled; not brought to an equality, as the credit and debtor side of an account. UNBALANCED BID, a bid for the performance of work in which the rates specified for each of the various kinds of labor or material required have been based upon an erroneous estimate of the quantities of each, thus making a high bid appear as a low estimate.

UNBALLASTED, a. *ŭn-băl'lăs-tĕd:* not kept steady by ballast; unsteady; without ballast.

UNBANDAGED, a. *ŭn-băn'dājd:* not wrapped with a bandage.

UNBANDED, a. *ŭn-bănd'ĕd:* lacking a band or string.

UNBAPTIZED, a. *ŭn'băp-tīzd':* not having received the sacrament of baptism.

UNBAR, v. *ŭn-bâr':* to unfasten; to open by removing bolts or bars.

UNBARBED, a. *ŭn-bârbd':* [L. *barba,* a beard]: in *OE.,* not shaven; also, bare.

UNBARKED, a. *ŭn-bârkt':* stripped of the bark; decorticated: *barked* is the word now used for *unbarked.*

UNBASHFUL, a. *ŭn-băsh'fûl:* not bashful; impudent; shameless.

UNBATED, a. *ŭn-bā'tĕd:* in *OE.,* not blunted; not repressed.

UNBATTERED, a. *ŭn-băt'tẽrd:* not injured by blows.

UNBEARABLE, a. *ŭn-bär'ă-bl:* not bearable; that cannot be borne or endured.

UNBEATEN, a. *ŭn-bēt'n:* not beaten; untrodden.

UNBECOMING, a. *ŭn'bĕ-kŭm'ĭng:* unsuitable; improper for the person or character; indecent. UN'BECOM'INGLY, ad. UN'BECOM'INGNESS, n. *-nĕs.*

UNBEFITTING, a. *ŭn'bĕ-fĭt'tĭng:* unsuitable; unbecoming.

UNBEFRIENDED, a. *ŭn'bĕ-frĕnd'ĕd:* not supported by friends.

UNBEGOT, a. *ŭn'bĕ-gŏt'*, or UN'BEGOT'TEN, a. *-gŏt'tn:* not generated; eternal; not yet generated.

UNBEGUN, a. *ŭn'bĕ-gŭn':* not yet begun.

UNBEHELD, a. *ŭn'bĕ-hĕld':* unseen; not beheld.

UNBELIEF, n. *ŭn'bĕ-lēf':* the withholding of belief; skepticism; infidelity; disbelief of divine revelation. UN'BELIEV'ER, n. *-lēv'ĕr,* an incredulous person; an infidel; one who does not believe in a divine revelation. UN'BELIEV'ING, a. incredulous; infidel; not acknowledging a divine revelation. UN'BELIEVED', a. discredited.—SYN. of 'unbeliever': infidel; deist; theist; freethinker; skeptic.

UNBELOVED, a. *ŭn'bĕ-lŭvd':* not loved.

UNBEND, v. *ŭn-bĕnd':* to become unbent; to relax; to make straight; to set at ease for a time; to become less rigid in manner; among *seamen,* to take the sails from the yards and stays; to cast loose, as a cable from an anchor; to untie one rope from another. UNBEND'ING, imp. relaxing from a strain: ADJ. unyielding; resolute; inflexible. UNBENT', pt. pp. relaxed; not strained; unstrung; loosed. UNBEND'INGLY, ad.

UNBENEFICED, a. *ŭn-bĕn'ĕ-fĭst:* not holding a benefice or church living.

UNBENIGHTED, a. *ŭn'bĕ-nīt'ĕd:* not visited by darkness.

UNBENIGN, a. *ŭn'bĕ-nīn':* malignant; malevolent.

UNBESEEMING, a. *ŭn'bĕ-sēm'ĭng:* unbecoming; not befitting.

UNBESOUGHT, a. *ŭn'bĕ-sawt':* not sought by petition or entreaty.

UNBESPOKEN, a. *ŭn-bĕ-spō'kn:* not bespoken or ordered beforehand.

UNBESTOWED, a. *ŭn'bĕ-stōd':* not given; not disposed of.

UNBEWAILED, a. *ŭn'bĕ-wāld':* not lamented.

UNBIAS, v. *ŭn-bī'ăs:* to free from bias or prejudice. UNBI'ASING, imp. UNBI'ASED, pp. *-ăst,* freed from prejudice or bias: ADJ. impartial; unprejudiced.

UNBID, a. *ŭn-bĭd',* or UNBID'DEN, a. *-bĭd'n:* not commanded; spontaneous; uninvited.

UNBIGOTED, a. *ŭn-bĭg'ŏt-ĕd:* free from bigotry.

UNBIND, v. *ŭn-bīnd':* to set free; to untie; to loose. UNBIND'ING, imp. setting free; untying. UNBOUND', pt. pp. *-bownd',* set free.

UNBISHOP, v. *ŭn-bĭsh'ŏp:* to deprive of episcopal orders.

UNBIT, a. *ŭn-bĭt'*, or UNBIT'TEN, a. *-bĭt'n:* not bitten.

UNBIT, v. *ŭn-bĭt':* to unbridle; among *seamen,* to remove the turns from off the bitts, as to *unbit* a cable.

UNBLAMABLE, a. *ŭn-blā'mă-bl:* free from blame or cause of blame; innocent; faultless. UNBLA'MABLY, ad. UNBLA'MABLENESS, n. the state of being unblamable. UNBLAMED', a. free from censure.

UNBLEACHED, a. *ŭn-blēcht':* not bleached or whitened.

UNBLEMISHED, a. *ŭn-blĕm'ĭsht:* not stained; free from blemish or from reproach; free from deformity; irreproachable. UNBLEM'ISHABLE, a. *-ĭsh-ă-bl,* incapable of being blemished.

UNBLENCHED, a. *ŭn-blĕnsht':* not confounded; undiminished. UNBLENCH'ING, a. not shrinking or flinching; firm.

UNBLENDED, a. *ŭn-blĕnd'ĕd:* not blended or mingled.

UNBLESSED, or UNBLEST, a. *ŭn-blĕst':* excluded from benediction; unhappy.

UNBLIGHTED, a. *ŭn-blīt'ĕd:* not blighted; unblasted.

UNBLOODY, a. *ŭn-blŭd'ĭ,* and UNBLOOD'IED, a. *-blŭd'-ĭd:* not stained with blood; not cruel.

UNBLOWN, a. *ŭn-blōn':* not having the bud expanded; not inflated with wind.

UNBLUNTED, a. *ŭn-blŭnt'ĕd:* not blunted or made obtuse or dull.

UNBLUSHING, a. *ŭn-blŭsh'ĭng:* destitute of shame; impudent. UNBLUSH'INGLY, ad.

UNBODIED, a. *ŭn-bŏd'ĭd:* freed from the body; incorporeal.

UNBOILED, a. *ŭn-boyld':* not cooked in boiling water.

UNBOLT, v. *ŭn-bōlt':* to remove a bolt from, as from a door; to unfasten; to set open. UNBOLT'ED, pp. a. freed from fastening by bolts; not having the bran separated, as in flour; unsifted.

UNBONNETED, a. *ŭn-bŏn'nĕt-ĕd:* without hat or bonnet; having no hat or bonnet on.

UNBOOKISH, a. *ŭn-bûk'ĭsh:* having but little of the knowledge that is obtained from books; not studious in books; unlearned; illiterate.

UNBOOTED, a. *ŭn-bôt'ĕd:* not having boots on.

UNBORN, a. *ŭn-bawrn':* not brought into life; still to appear, future.

UNBORROWED, a. *ŭn-bŏr'rōd:* genuine; original; one's own.

UNBOSOM, v. *ŭn-bûz'ŭm:* to disclose freely, as opinions and feelings; to reveal in confidence. UNBOS'OMING, imp. UNBOS'OMED, pp. revealed in confidence, as one's feelings and griefs.

UNBOTTOMED, a. *ŭn-bŏt'tŏmd:* without a bottom; having no solid foundation.

UNBOUGHT, a. *ŭn-bawt':* obtained without money or purchase; not finding a purchaser.

UNBOUND, a. *ŭn-bownd':* not bound; loose; free from obligation; without a cover, as a book; not yet bound up into a volume or volumes.

UNBOUNDED, a. *ŭn-bownd'ĕd:* having no bound or limit; infinite; unlimited; without check or control; unrestrained; extravagant; interminable. UNBOUND'EDLY, ad.

UNBOWED, a. *ŭn-bowd':* not bent or arched, as the body in stooping or kneeling.

UNBRACE, v. *ŭn-brās':* to loose; to relax. UNBRA'CING, imp. UNBRACED', pp.

UNBREATHABLE, a. *ŭn-brēth'ă-bl:* that cannot be respired or breathed. UNBREATHED', a. not breathed; in *OE.*, unexercised.

UNBRED, a. *ŭn-brĕd':* not polished in manners; ill educated; rude; in *OE.*, not begotten.

UNBREECHED, a. *ŭn-brĭcht':* having no breeches.

UNBREWED, a. *ŭn-brôd':* not mixed; genuine; pure.

UNBRIBED, a. *ŭn-brībd':* not corrupted or influenced by a gift of money.

UNBRIDLED, a. *ŭn-brī'dld:* unrestrained; licentious.

UNBROKEN, a. *ŭn-brō'kn:* not violated, as a promise; not subdued; not tamed; not accustomed to the saddle or harness, as a horse. UNBROKE', a. *-brōk',* for UNBROKEN.

UNBROTHERLY, a. *ŭn-brŭth'ėr-lī:* not becoming a brother; unkind.

UNBRUISED, a. *ŭn-brôzd:* not bruised; not hurt.

UNBUCKLE, v. *ŭn-bŭk'kl:* to loose from buckles; to unfasten. UNBUCK'LING, imp. UNBUCK'LED, pp.

UNBUILD, v. *ŭn-bĭld':* in *OE.*, to raze; to destroy. UNBUILT', a. *ŭn-bĭlt',* not yet built or erected.

UNBUOYED, a. *ŭn-boyd':* unmarked by buoys, as a channel; not borne up.

UNBURIED, a. *ŭn-bĕr'ĭd:* not put under-ground; not interred.

UNBURNED, a. *ŭn-bėrnd',* or UNBURNT', a. *-bėrnt':* not consumed by fire; not scorched; not baked.

UNBURTHEN, v. *ŭn-bėr'thn,* or UNBUR'DEN, v. *-dn:* to ease; to throw off; to relieve the mind or heart by revealing what lies heavily on it.

UNBUSINESS-LIKE, a. *ŭn-bĭz'nĕs-līk:* not like one accustomed to business; confused and irregular in the management of ordinary affairs.

UNBUTTON, v. *ŭn-bŭt'tn:* to loose the fastenings by buttons.

UNCAGE, v. *ŭn-kāj':* to release from a cage. UNCAGED', a. released from a cage or confinement.

UNCALCINED, a. *ŭn-kăl'sind:* not calcined.

UNCALCULATING, a. *ŭn-kăl'kū-lā-tĭng:* not in the habit of studying details; inconsiderate.

UNCALLED, a. *ŭn-kawld':* not summoned; not invited. UNCALLED-FOR, a. not required or needed; improper.

UNCANCELLED, a. *ŭn-kăn'sĕld:* not cancelled, crossed out, or erased; not annulled.

UNCANDID, a. *ŭn-kăn'dĭd:* not frank or sincere. UNCAN'DIDLY, ad.

UNCANNY, a. *ŭn-kăn'nĭ* [see CANNY]: in *Scot.* and *prov. Eng.,* not safe to meddle with; dangerous; not favorable or propitious; preternatural; ghost-like.

UNCANONICAL, a. *ŭn-kă-nŏn'ĭ-kăl:* not agreeable to the canons; not acknowledged as authentic. UN'CANON'ICALLY, ad. UN'CANON'ICALNESS, n. the state of being uncanonical.

UNCANVASSED, a. *ŭn-kăn'văst:* not canvassed.

UNCAP, v. *ŭn-kăp':* to remove a cap or cover from; to open.

UNCAPABLE, a. *ŭn-kā'pă-bl:* not capable; incapable.

UNCARED-FOR, a. *ŭn-kärd'fŏr:* not regarded or heeded.

UNCA'RIA. See GAMBIR.

UNCAS, *ŭng'kass:* Indian chief: about 1588—1682; b. in the Pequot settlement, e. Conn. He became a war chief of his tribe, but about 1635 headed a revolt against Sassacus, the sachem, organized his followers as an independent tribe, to which he gave the name Mohegan, formerly borne by the Pequots, and made friends with the whites. In 1637 he aided the English in their war against the Pequots, and 1643 was their ally in the war against the Narragansetts, in which he defeated and captured their sachem, Miantonomoh. Several tribes combined against him 1648, but with little success; and 1657 his people were relieved, while being besieged by the Narragansetts, by the English under Ensign Leffingwell. A monument to his memory has been erected in Norwich, Conn.

UNCASE, v. *ŭn-kās':* to take off or out, as from a cover; to display or exhibit the colors of a regiment.

UNCAUGHT, a. *ŭn-kawt':* not yet caught or taken.

UNCAUSED, a. *ŭn-kawzd':* existing without an author or a cause.

UNCEASING, a. *ŭn-sēs'ĭng:* continual; not intermitting; uninterrupted. UNCEAS'INGLY, ad.

UNCELEBRATED, a. *ŭn-sĕl'ĕ-brā-tĕd:* not solemnized.

UNCENSURED, a. *ŭn-sĕn'shûrd:* not censured; exempt from blame.

UNCEREMONIOUS, a. *ŭn'sĕr-ĕ-mō'nĭ-ŭs:* without ceremony; not formal. UN'CEREMO'NIOUSLY, ad.

UNCERTAIN, a. *ŭn-sėr'tĭn:* not certain or sure; doubtful; unsettled; precarious. UNCER'TAINTY, n. want of certainty or precision; doubtfulness; something unknown.

UNCHAIN, v. *ŭn-chān':* to unfasten, undo, or remove the chain; to set free from chains or restraint.

UNCHALLENGED, a. *ŭn-chăl'lĕnjd:* not objected to; not called to account.

UNCHANCY, a. *ŭn-chăn'sĭ* [*un*, not, and *chance*]: in *Scot.*, not lucky; dangerous.

UNCHANGEABLE, a. *ŭn-chānj'ă-bl:* not subject to variation or change; immutable. UNCHANGE'ABLENESS, n. the state or quality of being subject to no change; immutability. UNCHANGE'ABLY, ad. UNCHANGED', a. not changed or altered. UNCHANG'ING, a. suffering no alteration. UNCHANG'INGLY, ad.

UNCHARGE, v. *ŭn'chârj':* in *OE.*, to retract an accusation. UNCHARGED', a. not loaded, as a gun.

UNCHARITABLE, a. *ŭn-chăr'ĭ-tă-bl:* contrary to Christian love; severe in judging; harsh. UNCHAR'ITABLY, ad. UNCHAR'ITABLENESS, n. want of charity.

UNCHARTERED, a. *ŭn-châr'tėrd:* having no charter.

UNCHARY, a. *ŭn-chā'rĭ:* not cautious; not wary; not frugal.

UNCHASTE, a. *ŭn-chāst:* not chaste; not pure; libidinous. UNCHASTE'LY, ad. UNCHAS'TITY, n. *-chăs-tĭ-tĭ,* lewdness; unlawful indulgence of the sexual appetite.

UNCHASTISED, a. *ŭn'chăs-tīzd':* not corrected or punished.

UNCHECKED, a. *ŭn-chĕkt':* not restrained or hindered; not contradicted.

UNCHECKERED, or UNCHEQUERED, a. *ŭn-chĕk'ėrd:* not checkered; not diversified.

UNCHEERFUL, a. *ŭn-chēr'fûl:* gloomy; melancholy; sad. UNCHEER'FULNESS, n. *-nĕs,* gloominess of temper.

UNCHEWED, a. *ŭn-chôd:* not masticated or prepared by the teeth.

UNCHILD, v. *ŭn-chīld':* in *OE.*, to deprive of children; to render unworthy of the character of a child.

UNCHIVALROUS, a. *ŭn-chĭv'ăl-rŭs:* not according to chivalry.

UNCHRISTENED, a. *ŭn-krĭs'nd:* not baptized and named.

UNCHRISTIAN, a. *ŭn-krĭst'yăn:* contrary to the principles of Christianity; not converted to the Christian faith; infidel. UNCHRIST'IANIZE, v. to turn from the Christian faith.

UNCHURCH, v. *ŭn-chėrch':* to expel from a church.

UNCIAL, a. *ŭn'shal* [L. *uncĭālis,* pertaining to an ounce or inch—from *uncĭa,* the twelfth part of anything: F. *once;* It. *oncia,* an ounce or an inch—*lit.,* a letter an inch in size]: noting certain characters or letters of a large round kind between capital and small letters, used in the writing of anc. MSS., and in anc. inscriptions from the 3d to the 10th century A.D.; written or carved in uncial letters: N. an uncial letter, or a manuscript written in uncials; a letter standing for a word in anc. inscriptions.—*Uncial Letters,* which began to take the place of capitals in the middle of the 3d century, differ from capitals (in which the oldest Greek and Latin MSS. are written) in being composed or rounded and not straight lines, and in showing tendency toward greater expedition in style. Uncial writing arose as writing on papyrus or vellum became common, the necessity for more rapid execution leading to the practice of curving the lines. It was more easily learned than the cursive style, and this was probably the cause of its becoming the favorite mode of writing books of importance among the monkish scribes; while legal instruments, which required greater dispatch, were executed by professional scribes in a corrupted form of the Roman cursive hand. Uncial writing prevailed from the 6th to the 10th century. During the 6th and 7th centuries a transitional style of writing prevailed in Italy, and to some extent elsewhere, in which the letters approximated more nearly to the Roman cursive hand: this passed by gradual transition into the *minuscule* manner, or small hand, which from the beginning of the 10th century because usual in MSS.—See Silvestre's *Universal Palæography,* translated and edited by Sir F. Madden (Lond. 1850); *Traité de Diplomatique,* par deux Religieux Benedictins de la Congrégation de St. Maur Par. 1755).

UNCIATIM, ad. *ŭn-sĭ-ā'tĭm* [L. *uncĭa,* an unce]: ounce by ounce.

UNCIFORM, a. *ŭn'sĭ-fawrm* [L. *uncus,* a hook; *forma,* shape]: having a curved or hooked form, applied to the last bone of the second row of the wrist-bones. UN'CINATE, a. *-nāt* [L. *uncīnātus,* hooked]: in *bot.,* provided with a hooked process; furnished with hooked spines.

UNCIRCUMCISED, a. *ŭn-sėr'kŭm-sīzd:* not circumcised, applied to a Gentile as opposed to a Jew; sometimes in *N. Test.,* having had the operation of circumcision concealed. UNCIR'CUMCI'SION, n. *-sĭzh'ŭn,* want of circumcision, applied to the Gentiles, as opposed to Jews.

UNCIRCUMSCRIBED, a. *ŭn-sėr'kŭm-skrībd':* not bounded or limited.

UNCIVIL, a. *ŭn-sĭv'ĭl:* not courteous in manners; not polite; rude. UNCIV'ILLY, ad. UNCIV'ILIZED, a. not reclaimed from savage life; rude; coarse.—SYN. of 'uncivil'; uncourteous; discourteous; unpolite; uncourtly; unmannered; clownish.

UNCLAIMED, a. *ŭn-klāmd′:* not demanded; not called for.

UNCLARIFIED, a. *ŭn-klăr′ĭ-fīd:* not purified or made clear.

UNCLASP, v. *ŭn-klăsp′:* to open what is fastened with a clasp; to open that which clasps or embraces; to release from an embrace; in *OE.*, to disclose.

UNCLASSIC, a. *ŭn-klăs′sĭk,* or UNCLAS′SICAL, a. *-sĭ-kăl:* not according to the best models of writing; not pertaining to or in accord with the classical writers, or to classical style.

UNCLE, n. *ŭng′kl* [F. *oncle*—from L. *avun′cŭlus,* an uncle]: the brother of one's father or mother; a name also given to the husband of an aunt.

UNCLEAN, a. *ŭn-klēn′:* foul; dirty; filthy; ceremonially impure; unchaste. UNCLEANLY, a. *ŭn-klĕn′lĭ,* foul; filthy; nasty. UNCLEAN′LINESS, n. *-klĕn-,* want of cleanliness. UNCLEAN′NESS, n. *-klēn-,* foulness; dirtiness; ceremonial impurity; defilement by sin; unchastity; lewdness. UNCLEANSED′, a. *-klĕnzd,* not purified.

UNCLEAN′NESS, in the Old Testament: state of bodily infirmity which, for the time being, excluded the sufferer from the 'holy community.' This state of disability was induced in a variety of ways: birth, death, the different sexual functions and infirmities, all were, in different manner, causes of uncleanness, and treated according to their different degrees. To a certain extent some incongruous admixtures of plants, animals, even of materials in one garment, etc., also may be reckoned among things that 'defile,' or gave rise to a certain uncleanness. Fruits of a tree during its first three years were regarded as 'uncircumcised' and unclean and not to be eaten. See PURIFICATION; LEPROSY.

UNCLEANNESS, CEREMONIAL: in various religious systems the lack of ritual purity or fitness. In the Brahmanic system food cooked by a Sudra or by an outcast is unclean to the Brahman; he loses caste if he eats of it; and he contracts ceremonial uncleanness if he consorts with unclean persons, as the Pariah, the Mahar, or other outcasts. The heretical law of Judaism pronounced certain animals unclean and therefore not to be eaten. Of animals that 'chew the cud' all might be eaten, with exception of four; but of the four excepted —the camel, coney, hare, and swine—the first only is of the class of the ruminants. Among birds declared to be unclean are the eagle, ossifrage, vulture, kite, etc., of which several cannot be positively identified; but at all events the birds of prey are certainly included among the unclean birds, while most of the grain-feeding birds are allowed as articles of food. Among fishes or aquatic creatures those are unclean which have neither fins nor scales. Except the leaping orthoptera—locusts, grass-

hoppers, etc.—most insects are unclean, as also all creeping things, from vertebrate reptiles to molluscous snails. And not merely were unclean animals to be rejected as food, their carcasses were to be avoided, and whoever touched them became thereby unclean. The laws of ceremonial uncleanness were never of obligation in the religion of Jesus Christ, who taught that 'not that which entereth into the mouth defileth the man; but that which proceedeth out of the mouth; this defileth the man'; and with regard to persons, Saint Peter, after the vision of the sheet let down, would no longer call any man common or unclean.

UNCLEAVABLE, a. *ŭn-klēv'ă-bl:* that cannot be split.

UNCLERICAL, a. *ŭn-klĕr'ĭ-kăl:* unbecoming a clergyman; contrary to the clerical character.

UN'CLE SAM: jocular name of the United States government or nation, used as John Bull is with respect to England; supposably a humorous extension of the letters U. S. (United States).

UNCLE TOM: hero of *Uncle Tom's Cabin:* see HENSON, JOSIAH: also STOWE, HARRIET ELIZABETH (BEECHER).

UNCLEW, v. *ŭn-klô':* to undo.

UNCLIPPED, a. *ŭn-klĭpt':* not clipped; not diminished or shortened by clipping.

UNCLOAKED, a. *ŭn-klōkt':* not covered or disguised.

UNCLOG, v. *ŭn-klŏg':* to free from anything that retards motion; to set at liberty. UNCLOGGED', a. set free from obstructions.

UNCLOISTER, v. *ŭn-kloys'tĕr:* to set at large; to free from confinement.

UNCLOSE, v. *ŭn-klōz':* to open; to break the seal of, as a letter. UNCLO'SING, imp. breaking the seal of. UNCLOSED, pp.: ADJ. open; not finished; not sealed.

UNCLOTHE, v. *ŭn-klōth':* to strip of clothes; to make naked. UNCLOTH'ING, imp.: N. act of taking off clothes. UNCLOTHED', pp.: ADJ. not clothed; wanting clothes.

UNCLOUDED, a. *ŭn-klowd'ĕd:* free from clouds; not obscured. UNCLOUD'EDNESS, n. freedom from obscurity or gloom. UNCLOUD'Y, a. free from clouds; clear; free from obscurity or gloom.

UNCOATED, a. *ŭn-kōt'ĕd:* not covered with a coat.

UNCOCK, v. *ŭn-kŏk':* to let down the hammer of a gun or pistol.

UNCOFFINED, a. *ŭn-kŏf'fĭnd:* not furnished with or placed in a coffin.

UNCOIF, v. *ŭn-koyf':* to pull the cap off. UNCOIFED', a. not wearing a coif or cap.

UNCOIL, v. *ŭn-koyl':* to unwind or open, as the turns of a rope.

UNCOINED, a. *ŭn-koynd':* not coined; in bars or ingots.

UNCOLLECTED, a. *ŭn'kŏl-lĕk'tĕd:* not brought together; not recovered from confusion or wandering, as the mind.

UNCOLORED, a. *ŭn-kŭl'ėrd:* not stained or dyed; not heightened in description.

UNCOMBED, a. *ŭn-kōmd':* not dressed with a comb.

UNCOMBINED, a. *ŭn'kŏm-bīnd':* not combined; simple; separate. UN'COMBI'NABLE, a. incapable of being combined or united.

UNCOMEATABLE, a. *ŭn'kŭm-ăt'ă-bl* [*un, come, at,* and *able*]: in *familiar language,* that cannot be come at; inaccessible.

UNCOMELY, a. *ŭn-kŭm'lĭ:* wanting in grace; unseemly. UNCOME'LINESS, n. *-nĕs,* want of beauty or grace.

UNCOMFORTABLE, a. *ŭn-kŭm'fėrt-ă-bl:* affording no comfort; giving uneasiness; gloomy. UNCOM'FORTABLY, ad. UNCOM'FORTABLENESS, n. the want of ease or rest.

UNCOMMANDED, a. *ŭn'kŏm-mând'ĕd:* not required by order or law; without the proper officers, as in the case of troops.

UNCOMMENDED, a. *ŭn'kŏm-mĕnd'ĕd:* not praised or lauded. UN'COMMEN'DABLE, a. not worthy of praise or approbation.

UNCOMMISERATED, a. *ŭn'kŏm-mĭz'ėr-ā-tĕd:* not pitied.

UNCOMMITTED, a. *ŭn'kŏm-mĭt'tĕd:* not committed; not pledged by anything said or done; not referred to a committee, as in parliament.

UNCOMMON, a. *ŭn-kŏm'mŏn:* not usual; rare; not often seen or known. UNCOM'MONLY, ad. to an unusual degree. UNCOM'MONNESS, n. *-mŏn-nĕs,* the state of being uncommon; infrequency; rareness.—SYN. of 'uncommon': unusual; unwonted; rare; scarce; infrequent.

UNCOMMUNICATED, a. *ŭn'kŏm-mū'nĭ-kā-tĕd:* not disclosed or delivered to others. UN'COMMU'NICATIVE, a. not communicative; reserved.

UNCOMPANIONABLE, a. *ŭn'kŏm-păn'yŭn-ă-bl:* not companionable; not sociable.

UNCOMPASSIONATE, a. *ŭn'kŏm-păsh'ŭn-āt:* having no pity or mercy.

UNCOMPENSATED, a. *ŭn'kŏm'pĕn-sā-tĕd:* not compensated; not rewarded.

UNCOMPLAINING, a. *ŭn'kŏm-plān'ĭng:* not murmuring or disposed to murmur.

UNCOMPLAISANT, a. *ŭn-kŏm'plā-zănt':* not civil; not courteous.

UNCOMPLETED, a. *ŭn'kŏm-plē'tĕd:* not completed; not finished.

UNCOMPLICATED, a. *ŭn-kŏm'plĭ-kā-tĕd:* not complicated; simple.

UNCOMPLIMENTARY, a. *ŭn'kŏm-plĭ-mĕn'tėr-ĭ:* not expressing civility or praise; rude.

UNCOMPLYING, a. *ŭn'kŏm-plī'ĭng:* unbending, as in disposition; not yielding to request or command; obdurate.

UNCOMPOUNDED, a. *ŭn'kŏm-pownd'ĕd:* not mixed; not intricate; simple.

UNCOMPREHENSIVE, a. *ŭn'kŏm-prĕ-hĕn'sĭv:* not comprehensive; unable to comprehend; in *OE.*, incomprehensible.

UNCOMPRESSED, a. *ŭn'kŏm-prĕst:* free from compression.

UNCOMPROMISING, a. *ŭn-kŏm'prō-mī'zĭng:* not compromising; not agreeing to terms; unyielding.

UNCONCEALED, a. *ŭn'kŏn-sēld':* not concealed or hid; not kept close or secret.

UNCONCEIVED, a. *ŭn-'kŏn-sēvd':* not thought or imagined.

UNCONCERN, n. *ŭn'kŏn-sėrn':* want of concern; absence of anxiety; indifference. UN'CONCERNED', a. not anxious; having no interest in; unmoved; indifferent. UN'CONCERN'EDLY, ad. with entire indifference; without interest or affection.

UNCONCILIATED, a. *ŭn'kŏn-sĭl'ĭ-ā-tĕd:* not propitiated; not brought into a state of friendship. UN'CONCIL'IATING, a. not of winning or engaging manners; not adapted to gain favor. UN'CONCIL'IATORY, a. not tending to gain favor.

UNCONCLUDED, a. *ŭn'kŏn-klô'dĕd:* not concluded or finished; not decided; not closed.

UNCONCOCTED, a. *ŭn'kŏn-kŏk'tĕd:* not concocted; not digested; not matured.

UNCONDEMNED, a. *ŭn'kŏn-dĕmd':* not condemned; not judged guilty; not disapproved, as a custom.

UNCONDENSED, a. *ŭn'kŏn-dĕnst':* not reduced to a smaller compass; not returned into its original form, as steam into water.

UNCONDITIONAL, a. *ŭn'kŏn-dĭsh'ŭn-ăl:* absolute; unreserved; not limited by conditions. UN'CONDI'TIONALLY, ad. without terms of limitation. UNCONDI'TIONED, a. *-dĭsh'ŭnd,* not having conditions or relations; absolute. THE UNCONDITIONED, in *metaph.*, that which is absolute or without limitation.

UNCONFINED, a. *ŭn'kŏn-fīnd':* free from restraint or control; unbounded. UNCONFI'NABLE, a. *-fī'nă-bl,* **in**capable of being confined; boundless.

UNCONFIRMED, a. *ŭn'kŏn-fėrmd':* not confirmed or established; not fortified by resolution; not strengthened by additional testimony; not confirmed according to the church ritual.

UNCONFORMABLE, a. *ŭn'kŏn-fawrm'ă-bl:* not conforming; not consistent; not agreeable or agreeing; in *geol.*, applied to strata when one stratum or series of strata is laid on the upturned edges of another series. UN'CONFORM'ABLY, ad. UN'CONFORM', a. *OE.* for UNCONFORMABLE. UN'CONFORM'ITY, n. *-ĭ-tĭ,* disagreement; absence of conformity.

UNCONFORM'ABLE STRATA: strata which rest on the more or less inclined edges of older beds.

UNCONFORMITY: in *geol.*, a term commonly used to describe a discordant relation of the strata of two groups to each other. We may conveniently distinguish two types of unconformity,—structural and stratigraphic. In structural unconformities the later or newer strata rest upon the more or less truncated edges of the older. The sequence of event implied here is: 1st, folding of the older strata, after their deposition, and their conversion from sea-bottom to land; 2d, erosion of the folded strata, until the folds have been truncated by a more or less perfect erosion plane; 3d, subsidence, and deposition of the later strata upon this plane. The more intense the folding, and the more perfect the erosion surface on which the later strata are deposited, the longer is generally the time interval represented by the unconformity. Thus on the Hudson river, the Ordovicic Hudson group of strata has suffered strong folding and more or less complete peneplenation during early Siluric time, before the Upper Siluric Manlius limestone was deposited.

A stratigraphic unconformity or hiatus is much less readily detected, because the strata have the same structural relations to each other. They appear perfectly conformable, nevertheless a great gap exists between them, in which a number of formations are represented. This type of unconformity indicates a change to land conditions, with probable erosion, but without folding after the deposition of the older strata, and a re-submergence of the surface and the deposition thereon of the later strata. Such an unconformity exists throughout the central part of the United States between the Siluric and Devonic.

UNCONFUSED, a. *ŭn'kŏn-fūzd':* not confused or embarrassed.

UNCONFUTED, a. *ŭn'kŏn-fū'tĕd:* not confuted or overthrown. UNCONFU'TABLE, a. *-tă-bl,* incapable of being confuted.

UNCONGEALED, a. *ŭn'kŏn-jēld':* not congealed or frozen.

UNCONGENIAL, a. *ŭn'kŏn-jē'nĭ-ăl:* not congenial.

UNCONNECTED, a. *ŭn'kŏn-nĕk'tĕd:* not united; separate; loose; vague; incoherent.

UNCONNIVING, a. *ŭn'kŏn-nī'vĭng:* not conniving; not overlooking or winking at.

UNCONQUERABLE, a. *ŭn-kŏng'kėr-ă-bl:* that cannot be overcome or subdued; invincible; insuperable. UNCON'QUERABLY, ad. UNCON'QUERED, a. not vanquished or defeated; unsubdued.

UNCONSCIENTIOUS, a. *ŭn-kŏn'shĭ-ĕn'shŭs:* not regulated or restrained by conscience.

UNCONSCIONABLE, a. *ŭn-kŏn'shŭn-ă-bl:* not guided or influenced by conscience; unreasonable. UNCON'SCIONABLY, ad. in a manner that conscience and reason do not justify.

UNCONSCIOUS, a. *ŭn-kŏn'shŭs:* (1) not conscious, without consciousness; with broader implications,—not mental or without mind. Until recently it was used to include all such subliminal states as a swoon, sleep, hypnosis, epilepsy, trance, and the loss of consciousness under anæsthetics. The greater portion of that field, e.g., dreams, hypnotic phenomena, and the numerous forms of automatisms are now spoken of as subconscious (q.v.). The distinction between the two terms is difficult to draw. The distinction between conscious and mental in the above two definitions is important, because the former does not deny mentality in denying consciousness. Many would hold that unconscious mental process is not a contradiction in terms, but merely a case of poverty in words. It is often used as a mere negative of awareness. as with reference to absent-mindedness or the unnoticed components in a perceptional fusion.

(2) A postulate, in the Herbartian psychology, of an unconscious substrate which interposed between our conscious ideas, out of which they arise, and into which they vanish.

(3) (THE) the absolute principle, the active force in the inorganic, the organic and the mental alike, according to the metaphysics of Edw. v. Hartmann. See: UNCONSCIOUS CEREBRATION.

UNCONSCIOUS CEREBRATION: phrase applied to designate the doctrine that the brain may evolve intelligent reactions without the accompaniment of overt conscious process. One goes to sleep puzzling over a problem. One awakes without the remembrance of dreaming and finds the problem solved. One tries to recall a name and fails. The matter is put out of mind and presently, when not the object of thought, the name comes again into mind. These cases may illustrate certain of the phenomena which have led to the belief in unconscious cerebral action of a rational kind. A common view today considers all such acts as evincing the presence of a sub-conscious mind which works conjointly with the conscious mind, but whose presence is only in-

directly verifiable in such experiences as these suggested. Multiple personality, double personality (q.v.) involve phenomena which are also regarded on the one hand as giving evidence for the doctrine of unconscious cerebration and on the other for sub-conscious mental life. In the form of habit the brain executes a vast amount of intelligent work without the direct oversight of the mind. The complex activities of speech rest upon such brain action. The thought may be engaged upon some remote feature of the topic of conversation, while the brain superintends the making of the minute movements of articulation.

UNCONSCIOUSNESS: under unconsciousness may be grouped two or three types. There may be total abeyance, such as is seen in epilepsy, in sleep, in brain concussion, in severe injuries, in infectious diseases, in drugs, as anæsthetics, hypnotics, alcohol, etc. There may be subnormal conditions, semi-conscious, subconscious states which would properly be classed here, for in certain conditions, such as in some epileptics, some alcoholics, or hysterics, consciousness at one time may be acute and yet all memory of the former state may be obliterated in another condition. Some of these conditions are grouped under the heading of double personalities. Some of these represent true phenomena, the vast majority are frauds. Thus from the minor forms of 'absent-mindedness' through sleep, up to the deepest grades of unconsciousness produced by drugs, one can observe in life all the many steps of a large variety of unconscious phenomena.

UNCONSECRATED, a. *ŭn-kŏn'sĕ-krā-tĕd:* not consecrated or set apart.

UNCONSENTING, a. *ŭn'kŏn-sĕnt'ĭng:* not yielding consent.

UNCONSIDERED, a. *ŭn'kŏn-sĭd'ẽrd:* not considered or attended to.

UNCONSOLIDATED, a. *ŭn'kŏn-sŏl'ĭ-dā-tĕd:* not consolidated; not made solid.

UNCONSTANT, a. *ŭn-kŏn'stănt:* inconstant.

UNCONSTITUTIONAL, a. *ŭn-kŏn'stĭ-tū'shŭn-ăl:* contrary to the principles of the constitution. UNCON'STITU'TIONALLY, ad. in a manner not warranted by the principles and usages of the constitution.

UNCONSTRAINED, a. *ŭn'kŏn-strānd':* free from constraint; voluntary. UN'CONSTRAIN'EDLY, ad. without force or restraint; freely. UN'CONSTRAINT', n. freedom; ease.

UNCONSUMED, a. *ŭn'kŏn-sūmd':* not consumed or expended; not wasted or dissipated.

UNCONSUMMATED, a. *ŭn-kŏn'sŭm-mātĕd:* not fully completed.

UNCONTAMINATED, a. *ŭn'kŏn-tăm'ĭ-nā-tĕd:* not polluted or defiled.

UNCONTROLLABLE, a. *ŭn'kŏn-trōl'lă-bl:* that cannot be controlled; ungovernable; irresistible. UN'CONTROL'LABLY, ad. UN'CONTROLLED', a. not governed or restrained; not resisted; unopposed. UN'CONTROL'LEDLY, ad. *-lĕd-lĭ.*

UNCONTROVERTED, a. *ŭn-kŏn'trō-vĕrt'ĕd:* not controverted or disputed; not liable to be called in question.

UNCONVERSABLE, a. *ŭn'kŏn-vĕr'să-bl:* not ready in conversation; not social.

UNCONVERTED, a. *ŭn'kŏn-vĕrt'ĕd:* not changed; not changed in opinion or life. UN'CONVER'TIBLE, a. that cannot be converted or changed in form.

UNCONVINCED, a. *ŭn'kŏn-vĭnst':* not persuaded or satisfied. UN'CONVIN'CING, a. without persuasive force.

UNCOOKED, a. *ŭn-kŭkt':* not cooked or dressed, as food.

UNCORK, v. *ŭn-kŏrk':* to draw the cork from.

UNCORRECTED, a. *ŭn'kŏr-rĕk'tĕd:* not corrected; not revised; not amended; not rendered exact.

UNCORROBORATED, a. *ŭn'kŏr-rŏb'ŏ-rā-tĕd:* not confirmed.

UNCORRUPT, a. *ŭn'kŏr-rŭpt':* not depraved; not tainted with wickedness. UN'CORRUP'TED, a. not vitiated; not depraved or perverted. UN'CORRUP'TIBLE, a. that cannot be corrupted. UN'CORRUPT'NESS, n. rectitude; uprightness; purity.

UNCOUNTED, a. *ŭn-kownt'ĕd:* not numbered or counted.

UNCOUPLE, v. *ŭn-kŭp'l:* to loose; to disjoin, said of dogs, railway cars, or of things generally that are coupled or joined. UNCOUP'LING, imp. UNCOUP'LED, a. set loose or free; single; not wedded.

UNCOURTEOUS, a. *ŭn-kĕr-tē-ŭs:* uncivil; unpolite. UNCOUR'TEOUSLY, ad. UNCOUR'TEOUSNESS, n. disobliging treatment; incivility. UNCOURT'LY, *-kōrt'lĭ*, a. not elegant or refined in manners, as those trained at the court of a prince; coarse; rustic.

UNCOUTH, a. *ŭn-kōth'* [AS. *un*, not, and *cuth*, known: AS. *cunnan*, to know (see CUNNING)]: strange; awkward; ungraceful; ungainly; in *OE.*, unknown. UNCOUTH'LY, ad. *-lĭ*, oddly; strangely. UNCOUTH'NESS, n. *-nĕs*, oddness; strangeness; awkwardness.—SYN. of 'uncouth': coarse; rude; clumsy; odd; ungainly; rough; gross.

UNCOVENANTED, a. *ŭn-kŭv'ĕ-nănt-ĕd:* not having joined in a league, covenant, or agreement, as in the Solemn League and Covenant of the Scottish people in the persecuting times of the Stuarts; in *theol.*, applied by some to those who have not entered into that relationship which God has been pleased, through Christ Jesus, to establish between Himself and His people, by such appointed means of grace as baptism and the Eucharist, as when a person dies unbaptized he is said to be left to the *uncovenanted* mercies of God; in the *old E. I. civil service*, applied to

that department in which no entrance examination is required, and the appointees are not subject to any formal engagement, but may resign or be dismissed at any time: see also under COVENANT.

UNCOVER, v. *ŭn-kŭv'ėr:* to remove any covering from; to deprive of clothes; to unroof, as a building; to lay open or bare; to bare the head in token of respect. UNCOV'ERING, imp. laying open to view. UNCOV'ERED, pp. laid open to view; laid bare.

UNCREATE, v. *ŭn'krē-āt':* in *OE.*, to annihilate; to deprive of existence: ADJ. not formed or made; not produced by creation; self existent. UNCREATED, a. *ŭn'krē-ā'tĕd,* not yet created; not produced by creation.

UNCREDITED, a. *ŭn-krĕd'ĭt-ĕd:* not set to the credit of; not believed.

UNCRITICAL, a. *ŭn-krĭt'ĭ-kăl:* not critical; lacking the critical faculty; not according to the just rules of criticism.

UNCROPPED, a. *ŭn-krŏpt':* not gathered; lying in fallow.

UNCROSSED, a. *ŭn-krŏst':* not cancelled; not opposed; not thwarted.

UNCROWDED, a. *ŭn-krowd'ĕd:* not closely pressed together; not thronged.

UNCROWN, v. *ŭn-krown':* to deprive of a crown; to deprive of sovereignty. UNCROWNED', a. *-krownd',* not crowned; deprived of a crown.

UNCRYSTALLIZABLE, a. *ŭn-krĭs'tăl-lī'zŭ-bl:* that cannot be formed into crystals. UNCRYS'TALLIZED, a. not converted into crystals.

UNCTION, n. *ŭngk'shŭn* [F. *onction,* unction—from L. *unctiō* or *unctiōnem,* an anointing; *unctus,* anointed, smeared; *ungĕrĕ,* to anoint]: in *OE.*, the act of anointing; the act of rubbing or smearing with fat or fatty matter; anything softening; hence, in modern usage, that mode of address, tone of expression, or peculiar quality in the words used, which inspires the hearer with feelings of devotion, tenderness, sympathy, or the like; divine or sanctifying grace; also, contemptuously, hypocritical blandness or suavity. EXTREME UNCTION, in the *Rom. Cath. Chh.,* the sacrament or rite of anointing with consecrated oil, administered to persons at the point of death. UNC'TUOUS, a. *-tū-ŭs,* resembling oil or grease; oily; greasy; extremely bland or suave in address; in *min.*, having a greasy or soapy feel. UNC'TUOUSNESS, n. *-nĕs,* or UNC'TUOS'ITY, n. *-ŏs'ĭ-tĭ,* quality of being oily or greasy; fatness; oiliness; blandness of address.—*Unction,* the practice of anointing the body, or certain portions of the body, with oil, especially with the oil of olives, was resorted to by the ancients from motives of health (see OILS), of athletic development, or of luxury; but the practice is noticeable here chiefly in its relations to religion. Anointing with oil seems to have been supposed to carry with it the same effects in spiritual things which it produces in the natural

world. It was a rite in frequent use among the Egyptians, as well as the Greeks and Romans; and the scriptural narrative of the ante-Mosaic religion contains evidence of its use (Gen. xxviii. 18, xxxi. 13). In the Mosaic ceremonial its use is still more frequent. Priests and kings were anointed on being set apart for office; also sacred vessels. The oil employed in these anointings was prepared of the most precious perfumes and balsams, and Ezekiel rebukes the Jews (xxiii. 41) for making a similar unguent for their personal uses. The special significance of the rite may be inferred from the circumstance that the popular name of the expected Messiah was the Christos, i.e., the Anointed. In Christian use, anointing from a very early time possessed the same sacred significance (see James v. 13–18): for its ecclesiastical use, see EXTREME UNCTION. Besides the anointing of the sick, however, there are many other sacred unctions traceable in ancient Christian practice—namely, in baptism, in confirmation, in ordination of priests and other clergy, in consecration of churches and altars, benediction of sacred vessels and utensils, etc. U. has been employed also in the coronation of kings; and in some countries curious traditions and legends are preserved connected with the unction of the king, or arising out of it: see RHEIMS.

UNCULTIVATED, a. *ŭn-kŭl'tĭ-vā-tĕd:* not cultivated; not instructed; not civilized; rough in manners; wild; in a state of nature.

UNCUMBERED, a. *ŭn-kŭm'bĕrd:* not burdened; not embarrassed.

UNCURBED, a. *ŭn-kĕrbd':* not curbed or restrained; licentious. UNCUR'BABLE, a. *-kĕr'bă-bl,* that cannot be curbed.

UNCURED, a. *ŭn-kūrd':* not cured or healed.

UNCURL, v. *ŭn-kĕrl':* to loose from ringlets; to lose the curl, or become straight. UNCURLED', a. not formed into ringlets.

UNCURRENT, a. *ŭn-kŭr'rĕnt:* not current; not passing as a common coin.

UNCURSE, v. *ŭn-kĕrs':* to free from any execration. UNCURST', pp. *-kĕrst',* not execrated.

UNCURTAILED, a. *ŭn'kĕr-tāld':* not curtailed or shortened.

UNCUT, a. *ŭn-kŭt':* not cut, as a precious stone; not separated or divided by cutting, especially said of the leaves of a book that have not been cut or dressed in the binding.

UNDAMAGED, a. *ŭn-dăm'ĭjd:* not damaged, spoiled, or made worse.

UNDATED, a. *ŭn-dā'tĕd:* having no date.

UNDATED, a. *ŭn'dā-tĕd* [L. *undātus,* in the form of waves—from *unda,* a wave]: having a waved surface; in *bot.,* rising and falling in waves toward the margin, as a leaf.

UNDAUNTED, a. *ŭn-dawnt'ĕd:* not subdued or depressed by fear; intrepid. UNDAUNT'EDLY, ad. UNDAUNT'EDNESS, n. fearless bravery.—SYN. of 'undaunted': bold; fearless; brave; courageous; valiant; gallant; heroic.

UNDAZZLED, a. *ŭn-dăz'ld:* not dazzled; not dimmed or confused by splendor.

UNDEAF, v. *ŭn-dĕf':* to free from deafness.

UNDEBASED, a. *ŭn'dĕ-bāst':* not debased; not adulterated.

UNDEBAUCHED, a. *ŭn'dĕ-bawcht':* not debauched; not corrupted.

UNDECAGON, n. *ŭn-dĕk'ă-gŏn* [L. *undecim*, eleven; Gr. *gōnĭa*, an angle]: a plane figure having eleven angles or sides.

UNDECANE, n. *ŭn'dē-kān* [L. *unus;* Eng. *decane*]: in *chem.*, $C_{11}H_{24}$; one of the series of paraffins obtained from Amer. petroleum. It has a sp. gr. of ·765 at 16°, and boils at 180° to 184°.

UNDECAYED, a. *ŭn'dĕ-kād':* still in full strength; not impaired by age or accident. UN'DECAY'ING, a. not suffering diminution or decline.

UNDECEIVABLE, a. *ŭn'dĕ-sēv'ă-bl:* not subject to be imposed on or misled. UN'DECEIVE', v. to free from deception, cheat, or mistake. UN'DECEIV'ING, imp. UN'DECEIVED', pp.

UNDECIDED, a. *ŭn'dĕ-sī'dĕd:* not decided or determined; wavering; hesitating.

UNDECIPHERED, a. *ŭn'dĕ-sī'fĕrd:* not deciphered or explained. UN'DECI'PHERABLE, a. incapable of being deciphered; enigmatic.

UNDECKED, a. *ŭn-dĕkt':* not decked or adorned; not having a deck, as a ship. UNDECK', v. *-dĕk'*, in *OE.*, to deprive of ornaments.

UNDECLARED, a. *ŭn'dĕ-klārd':* not declared or avowed.

UNDECLINABLE, a. *ŭn'dĕ-klī'nă-bl:* that cannot be declined or avoided. UN'DECLINED', a. in *gram.*, not declined or varied in termination, as a noun.

UNDECOMPOSABLE, a. *ŭn'dē-kŏm-pō'ză-bl:* that cannot be resolved into its constituent elements. UN'DECOMPOSED', a. not resolved, as into constituent elements.

UNDECORATED, a. *ŭn-dĕk'ō-rā-tĕd:* not adorned or embellished; plain.

UNDECORTICATED, a. *ŭn'dĕ-kŏr'tĭ-kā-tĕd:* not freed or cleaned from bark, husks, and the like.

UNDEDICATED, a. *ŭn-dĕd'ĭ-kā-tĕd:* not dedicated or consecrated; not inscribed to a patron.

UNDEEDED, a. *ŭn-dēd'ĕd:* in *law*, not transferred by deed; in *OE.*, not signalized by a deed or action.

UNDEFACED, a. *ŭn'dĕ-fāst':* not disfigured; not deprived of its form; not obliterated; legible. UN'DEFACE'ABLE, a. that cannot be defaced or disfigured.

UNDEFENDED, a. *ŭn'dĕ-fĕnd'ĕd:* not protected; without works of defense; exposed to assault; not defended, as an action in a court of law.

UNDEFIED, a. *ŭn'dĕ-fīd':* not set at defiance; not challenged.

UNDEFILED, a. *ŭn'dĕ-fīld':* not stained; not polluted; pure; clean.

UNDEFINABLE, a. *ŭn'dĕ-fī'nă-bl:* not capable of being described or limited; indefinable. UN'DEFINED', a. not having its limits described; not described by definition or explanation.

UNDEFRAYED, a. *ŭn'dĕ-frād':* not defrayed or paid.

UNDEJECTED, a. *ŭn'dĕ-jĕk'tĕd:* not dejected; not depressed.

UNDELIBERATED, a. *ŭn'dĕ-lĭb'ĕr-ā-tĕd:* not carefully considered.

UNDELIGHTED, a. *ŭn'dĕ-līt'ĕd:* not well pleased.

UNDELIVERED, a. *ŭn'dĕ-lĭv'ĕrd:* not delivered; not communicated.

UNDEMOLISHED, a. *ŭn'dĕ-mŏl'ĭsht:* not demolished, pulled down, or destroyed.

UNDEMONSTRABLE, a. *ŭn'dĕ-mŏn'stră-bl:* not capable of demonstration. UN'DEMON'STRATIVE, a. not demonstrative; not free or communicative; reserved in manner. UNDEM'ONSTRATED, a. not proved.

UNDENIABLE, a. *ŭn'dĕ-nī'ă-bl:* that cannot be denied or contradicted; unquestionable; indisputable; positive; certain. UN'DENI'ABLY, ad.

UNDEPLORED, a. *ŭn'dĕ-plōrd':* not deplored or lamented.

UNDEPRAVED, a. *ŭn'dĕ-prāvd':* not corrupted or vitiated.

UNDEPRECIATED, a. *ŭn'dĕ-prē'shĭ-ā-tĕd:* not lowered in value.

UNDEPRIVED, a. *ŭn'dĕ-prīvd':* not deprived; not divested of by authority.

UNDER, prep. *ŭn'dĕr* [Dan. and Sw. *under;* Dut. *onder;* Icel. *undir;* Goth. *undar;* Ger. *unter*, under: allied to Skr. *antar;* L. *inter*, among, within]: beneath or below, expressing position with reference to something over or above, or which surmounts or towers aloft, as *under* the sun, the surface, the skin, a bushel, etc.; in a position or at a point inferior to or lower than; subordinate to; in a state of subjection to; subject to, as *under* certain conditions; in accordance with, as *under* the rule; in course of, as the question is *under* consideration; less than, as he is still *under* age; attested by, as *under* his own hand: AD. in a lower or subordinate condition; in subjection: ADJ. lower in position, rank, or degree; subordinate. TO KNOCK UNDER, to yield; to submit. UNDER ARMS, in *mil.*, fully equipped for action. UNDER FIRE, exposed to an enemy's shot. UNDERGROUND, below the surface of the ground. UNDER SAIL, among *seamen*, moved by sails; using sails—applied to a

ship when sailing, as distinguished from steaming. UNDER SENTENCE, condemned. UNDER THE LEE, to the leeward —that is, the sheltered side (see LEE). UNDER THE ROSE, in confidence; privately; secretly. UNDER WAY, in progress; moving—applied to the sailing of a ship; having started. TO KEEP UNDER, to hold in subjection.—The prep. *under* frequently coalesces with its noun to form adverbs and adjectives, as *underground, underfoot, underhand*, etc. *Note.*—All the possible compounds of *under* are not given in the vocabulary, but only those which are most likely to need explanation. Compounds of *under* not given may be found by consulting the cyclopedia for the separate parts. *Under* is not usually separated by a hyphen, and is sometimes prepositional, as *under*ground, and sometimes adverbial, as *under*done.

UNDERAGENT, n. *ŭn'dėr-ā'jĕnt:* an inferior agent.

UNDERBEAR, v. *ŭn'dėr-bär':* in *OE.*, to support; to endure; to line, as a dress. UNDERBORNE', pp. *-bōrn'*. UNDERBEAR'ING, imp.: N. in *OE.*, the act of supporting. UNDERBEAR'ER, n. *-bär'ėr*, one who supports or bears up a weight, as a coffin at a funeral.

UNDERBID, v. *ŭn'dėr-bĭd':* to bid less than the value, or than is offered by another. UN'DERBID'DING, imp.

UNDERBRED, a. *ŭn'dėr-brĕd:* of inferior breeding or manners; coarse; vulgar.

UNDERCLAY, n. *ŭn'dėr-klā:* in *geol.*, those beds of clay which immediately underlie seams of coal, and which seem to have formed the ancient soil or mud on which the vegetation of the coal-bed flourished.

UNDERCLERK, n. *ŭn'dėr-klėrk:* a junior clerk.

UNDERCLIFF, n. *ŭn'dėr-klĭf:* in *geol.*, a subordinate terrace or cliff between the sea and the original cliff, by the falling down of the upper part of the latter.

UNDERCOAT, n. *ŭn'dėr-kōt:* a coat worn beneath a greatcoat or other coat.

UNDERCROFT, n. *ŭn'dėr-krŏft* [*under*, and prov. Eng. *croft* for *crypt*, a vault (see CRYPT)]: a vault under the choir or chancel of a cathedral or other church; any secret walk or vault under ground.

UNDERCURRENT, n. *ŭn'dėr-kŭr-rĕnt:* a current below the surface of the water; hence, something active but not visible, said of a sentiment or tendency—as, an *undercurrent* of socialism.

UNDERDONE, a. *ŭn'dėr-dŭn':* done or cooked less than is requisite or usual.

UNDERDRAIN, n. *ŭn'dėr-drān:* a drain or trench below the surface: V. *ŭn'dėr-drān'*, to drain by cutting a channel below the surface of the ground. UN'DERDRAINED', pp. drained by cutting a channel below the surface.

UNDERFONG, v. *ŭn'dėr-fŏng'* [*under*, and AS. *fongen*, taken—from *fon*, to take, to seize (see FANG)]: in *OE.*, to take in hand; to undertake; to deceive; to ensnare.

UNDERFOOT, ad. *ŭn'dėr-fût:* under the feet; beneath: ADJ. servile; base; also applied to a kind of granite paving.

UNDERGIRD, v. *ŭn'dėr-gėrd':* to bind below; to gird round the bottom. See also FRAP.

UNDERGO, v. *ŭn'dėr-gō':* to endure something burdensome; to suffer; to sustain without sinking or yielding; to undertake; to hazard; to be subject to; be subjected to; experience; to underlie; to possess. UN'DERGO'ING, imp. UN'DERWENT', pt. *-wĕnt'*. UN'DERGONE', pp. *-gŏn'*, borne; sustained; endured.

UNDERGRADUATE, n. *ŭn'dėr-grăd'ū-āt:* a member or student of a university who has not taken his first degree. UN'DERGRAD'UATESHIP, n. the office or condition of an undergraduate.

UNDERGROUND, n. *ŭn'dėr-grownd:* a space beneath the surface of the ground: AD. or ADJ. beneath the surface of the earth, as *underground* railways.

UNDERGROUND RAILROAD, THE: a term made common in the United States prior to the civil war, denoting a secret method of conducting negro slaves from the southern states to Canada and free states in the north. Between the Ohio river and the Great Lakes were many abolitionists who gave shelter and assistance to escaping slaves, and their homes were known as stations of the underground railroad. Among those who were patrons of the 'underground' system were Wm. Lloyd Garrison, Wendell Phillips, T. W. Higginson and F. B. Sanborn. See ABOLITION.

UNDERGROWTH, n. *ŭn'dėr-grōth:* that which grows under trees.

UNDERHAND, a. *ŭn'dėr-hănd:* secret; done by meanness or fraud; clandestine: AD. by meanness and fraud; by secret means.

UNDERHILL, *ŭn'dėr-hĭl,* JOHN: colonist: d. about 1672; b. Warwickshire, England. He rendered army service in the Netherlands and at Cadiz; came to America 1630; became a representative of Boston in the assembly; commanded the colonial troops which defeated the Pequot Indians 1637; was banished because of his religious views; returned and was appointed governor of Exeter and Dover, N. H., 1641; removed to Flushing, L. I., 1646; and was an officer in the war between the Dutch and the Indians. He received a tract of 150 acres from the Mantinenoc Indians on Long Island 1667.

UNDERHUNG, a. *ŭn-dėr-hŭng':* projecting, as applied to the lower jaw.

UNDERIVED, a. *ŭn-dĕ-rīvd:* not borrowed; not received from a foreign source.

UNDER-KEEPER, n. *ŭn'dėr-kēp'ėr:* a subordinate keeper.

UNDERLAY, v. *ŭn'dėr-lā':* to lay or place under or beneath; to support by something laid under: N. same as UNDERLIE (q.v.). UN'DERLAY'ING, imp. UN'DERLAID', pp.

UNDER-LEASE, in Law: alienation by a lessee of part of his lease. Even an alienation of the whole lease, with reservation of the rent, has been regarded as an under-lease. When a lessee transfers all his interest in the lease, the act is an assignment, not an under-lease. The tenant in occupation by virtue of under-lease has the same rights as the first lessee, and no more.

UNDERLET, v. *ŭn'dėr-lĕt':* to sublet; to let below the value.

UNDERLIE, v. *ŭn'dėr-lī':* to lie beneath, as a support, to be liable to, as a challenge: N. in *mining,* the dip or inclination of a mineral vein viewed from above downward; also UNDERLAY, n.

UNDERLINE, v. *ŭn'dėr-līn':* to draw a line under; to mark with a line below the word or words. UN'DERLINED', pp. marked with a line underneath.

UNDERLING, n. *ŭn'dėr-lĭng* [dim. of *under*]: an inferior person or agent; a mere subordinate; a mean fellow.

UNDERMINE, v. *ŭn'dėr-mīn':* to form a mine under; excavate beneath, as earth or rock, for the purpose of creating a fall, or of blowing up the mass; to remove the foundation or support of anything; to injure by secret and dishonorable means. UN'DERMIN'ING, imp. UN'DERMINED', pp. UN'DERMI'NER, n. one who undermines; one who subverts by secret or dishonorable means.

UNDERMOST, a. *ŭn'dėr-mōst:* lowest in place or condition.

UNDERN, n. *ŭn'dėrn* [AS.—from *under,* which see]: in *OE.,* the third hour of the day, that is, 9 o'clock A.M.; or from 9 o'clock to noon (see TERCE); in *prov. Eng.,* the afternoon.

UNDERNEATH, ad. *ŭn-dėr-nēth'* [AS. *underneothan,* underneath—from *under,* under, and *neothan,* beneath]: below; in a lower place: PREP. beneath; below.

UNDERPAY, v. *ŭn'dėr-pā':* to pay at too small a rate; to pay too little.

UNDERPIN, v. *ŭn'dėr-pĭn:* to lay stones under, as a building, or wall on which it is to rest; to prop; to support by some solid foundation. UN'DERPIN'NING, n. the act of one who underpins; the stones on which a building immediately rests; the foundation-wall of a building.

UNDERPLOT, n. *ŭn'dėr-plŏt:* a series of events in a play proceeding collaterally with the main story; a subordinate plot; a clandestine scheme.

UNDERPROP, v. *ŭn'dėr-prŏp':* to support; to uphold.

UNDERRATE, v. *ŭn'dėr-rāt':* to rate below the value. UN'DERRA'TED, a. pp. valued too low.

UNDERRUN, v. *ŭn'dėr-rŭn':* among *seamen,* to pass a boat or ship along or under a cable or rope—the cable being raised and passed over the bows and stern, the men hauling the boat along by pulling upon the cable.

UNDERSAY, v. *ŭn'dėr-sā':* in *OE.,* to say in a slighting way, or by way of contradiction.

UNDER-SECRETARY, n. *ŭn'dėr-sĕk'rĕ-tā'rĭ:* an assistant secretary.

UNDERSELL, v. *ŭn'dėr-sĕl':* to sell at a lower price than.

UNDER-SERVANT, n. *ŭn'dėr-sėr'vănt:* a servant subordinate to another or others.

UNDERSETTER, n. *ŭn'dėr-sĕt'tėr* [*under,* and AS. *settan,* to place]: in *OE.,* a support; a prop; a pedestal.

UNDER-SHERIFF, n. *ŭn'dėr-shĕr'ĭf:* a sheriff acting under a superior; a deputy-sheriff.

UNDERSHOT, a. *ŭn'dėr-shŏt:* moved by water passing under or acting on the underpart, as the wheel of a mill.

UNDERSHRUB, n. *ŭn'dėr-shrŭb:* in *bot.,* a woody plant of small size, the ends of whose branches perish every year.

UNDERSIGN, v. *ŭn'dėr-sīn':* to write one's name at the foot. UN'DERSIGNED', a. subscribed at the bottom or end of a writing: N. the person or persons who subscribe their names to any document.

UNDERSIZED, a. *ŭn'dėr-sīzd:* of a size less than the common; stunted.

UNDERSOIL, n. *ŭn'dėr-soyl:* subsoil.

UNDERSONG, n. *ŭn'dėr-sŏng:* the chorus or burden of a song.

UNDERSTAND, v. *ŭn'dėr-stănd'* [*under,* and *stand:* AS. *understandan,* to understand]: to comprehend fully; to have just and adequate ideas of; to perceive; to discern; to know the meaning of; to know without expressing; to know what is not expressed; to infer; to be informed by another; to learn. UN'DERSTANDING, imp.: ADJ. knowing; skilful; intelligent: N. that power of the mind by which it is enabled to receive or comprehend the real state of things presented to it, or that by which men derive ideas from sensations; the faculty of reflection and generalization; occasionally among *metaphysicians,* the faculty of the mind which deals with real, practical, and material knowledge and the adaptation of means to ends, and which is distinguished from *reason—understanding,* discerning relations only, while *reason* intuitively discerns truth itself; intellect; comprehension; conception; intelligence; discernment; wisdom; terms of communication. Understanding as a technical term in philosophy is on the wane, probably because modern psychology recognizes no such distinction as that described between 'reason' and 'understanding.' UN'DERSTOOD', pt.

pp. UN'DERSTAND'ED, pp. *-stănd'ĕd,* OE. and *familiarly,* for UNDERSTOOD; known as to meaning or import.

UNDERSTATE, v. *ŭn'dėr-stāt':* to represent less strongly than the truth will bear; to state too low.

UNDERSTRAPPER, n. *ŭn'dėr-străp'pėr:* an inferior agent; a petty fellow.

UNDERSTUDY, n. *ŭn'dėr-stŭd'ĭ* [prefix *under;* Eng. *study*]: an actor or actress who studies a part allotted to another performer, so as to be ready to undertake it in case of necessity.

UNDERTAKE, v. *ŭn'dėr-tāk':* to engage in; to enter upon; to take in hand; to take upon one's self; to covenant; to stand bound; to promise; in *OE.,* to assume a character; to engage with; to have the charge of; to venture; to hazard. UN'DERTA'KING, imp. engaging in; beginning to perform: N. any business or project which a person engages to perform; an enterprise; an engagement; undertaker's business. UN'DERTOOK', pt. did undertake. UN'DERTA'KEN, pp. UN'DERTA'KER, n. one who engages in any business or project; one who makes or supplies coffins, prepares the dead for burial, and manages funerals.

UNDER-TENANT, n. *ŭn'dėr-tĕn'ănt:* one who holds from a tenant and not from the proprietor.

UNDERTIME, n. *ŭn'dėr-tīm:* in *OE.,* same as *Undern* (q.v.).

UNDERTONE, n. *ŭn'dėr-tōn:* a lower manner of speaking than usual; a low or subdued tone.

UNDERTOW, n. *ŭn'dėr-tō:* a nautical term for any decided undercurrent of water, opposite to that of the surface; the backward flow of a wave that breaks on a beach.

UNDERVALUE, v. *ŭn'dėr-văl'ū:* to value or estimate below the real worth; to rate too low; to esteem lightly; to hold in mean estimation; to despise. UN'DERVAL'UING, imp. UN'DERVAL'UED, pp. UN'DERVAL'UATION, n. a value or estimate below the real worth.

UNDERWENT: pt. of the verb UNDERGO (q.v.).

UNDERWOOD, n. *ŭn'dėr-wûd:* small trees and bushes growing among large trees; coppice.

UNDERWOOD, *ŭn'dėr-wûd,* ADIN BALLOU: lawyer: 1828, May 19—1888, Jan. 14; b. Milford, Mass. He graduated at Brown Univ. 1849; was admitted to the bar 1853; and practiced in Boston till the beginning of the civil war. He entered the Union army as capt. of vols. 1861; was commissioned col. 1863, Apr., and brig.-gen. Nov. 6; and was brevetted maj.gen. of vols. 1865, Aug. 13. A wound received while leading a charge to relieve the beleaguered army at Chattanooga 1863, Oct. 28, incapacitated him for service for more than a year. He was surveyor of the port of Boston 1865, Aug. 20—

1886, July. He published *History of the Thirty-third Massachusetts Regiment* (Boston 1881).

UN'DERWOOD, Benjamin Franklin: American author and editor: b. New York 1839, July 6. At the outbreak of the civil war he enlisted as a private in the Union army, was wounded and captured at the battle of Bull Run, and was not exchanged until 1862. He then became lieutenant and adjutant in the Rhode Island Heavy Artillery and served until the close of the war, acting in the meantime as war-correspondent for the Newport, R. I., *News*. He was engaged in lecturing for 30 years after the war and in 1870-85 he was particularly prominent as an exponent of religious 'free thought.' He was business manager and co-editor of the Boston *Index* in 1880-6 and in 1887 was engaged in a like capacity on the Chicago *Open Court*. He edited the *Illustrated Graphic News* in 1888, the *Philosophic Journal* in 1893-5, has written editorially for the *Free Thought Magazine* since 1893. He was secretary of the Psychical Science congress at the Columbian Exposition in 1893 and has published: *Influence of Christianity on Civilization* (1871); *Spencer's Synthetic Philosophy* (1891); *Utilitarian Ethics* (1903); etc.

UNDERWOOD, Francis Henry: American author: b. Enfield, Mass., 1825, Jan. 12; d. Edinburgh, Scotland, 1894, Aug. 7. He was educated at Amherst College, studied law in Kentucky, and was admitted to the bar in 1847. He returned to Massachusetts in 1849, was appointed clerk of the state senate in 1852, and in 1854 became literary adviser of the Boston publishing house of Phillips Sampson & Co. The establishment of *The Atlantic Monthly* by that firm was due to him and it was he who secured James Russell Lowell as editor-in-chief, Underwood being assistant editor. Two years later his connection with the periodical came to an end, and from 1859 to 1870 he was clerk of the supreme criminal court, Boston. He subsequently devoted himself to literary work till 1885, when he was appointed to succeed Bret Harte as consul at Glasgow, and while in Scotland he lectured on American literature. His term of office expired in 1889 and he returned to the United States for a time, but in 1893 was appointed consul at Edinburgh. He was the author of *Handbook of English Literature* (1871); *Handbook of American Literature* (1872); *Cloud Pictures* (1873); *Lord of Himself*, a novel of Kentucky life (1874); *Man Proposes*, a novel (1880); *The True Story of the Exodus*, an abridgment of the work of Dr. Brugsch-Bey (1880); biographies of *Longfellow* (1882); *Lowell* (1882); *Whittier* (1883); *Quabbin* (1890); *Dr. Gray's Quest*, a novel (1896). His best work is seen in *Quabbin*, a sympathetic study of life in a small New England town two generations ago. He had a wide acquaintance with books and men, possessed a fine critical sense and not a little literary power, but was to some

extent lacking in constructive skill, and his personality was stronger than anything he ever wrote.

UNDERWOOD, JOHN COX, C.E.: American soldier and civil engineer: b. Georgetown, D. C., 1840, Sep. 12. He was graduated as a civil engineer at the Rensselaer Polytechnic Institute, Troy, N. Y., in 1862, and served with distinction in the Confederate army during the civil war, reaching the rank of lieutenant-colonel. For nearly a year he was held as a prisoner at Fort Warren. In 1870-2 he was mayor of Bowling Green, Ky., and during 1866-75 served as city, county, and consulting state engineer. From 1875 to 1879 he was lieutenant-governor of Kentucky. He was prominent in several secret fraternal organizations and Confederate patriotic societies; published many reports embracing plans for architectural and civil engineering works; and in 1896 was chosen superintendent and secretary of the Confederate Memorial Association.

UNDERWOOD, LUCIEN MARCUS: American educator and botanist: b. New Woodstock, N. Y., 1853, Oct. 26; d. Redding, Conn., 1907, Nov. 16. He was graduated from Syracuse University in 1877 and was professor of botany there 1883-91. From 1896 he was professor of botany at Columbia. He published *Systematic Plant Record* (1881); *Our Native Ferns, and How to Study Them* (1881); *North American Hepaticæ* (1884); *Our Native Ferns and Their Allies* (1888); *Moulds, Mildews and Mushrooms* (1899); etc.

UNDERWORK, v. *ŭn'dėr-wėrk':* to attempt to destroy or injure by clandestine measures; to work at a less price than others; to expend too little work on: N. *-wėrk,* subordinate work; petty affairs. UNDERWROUGHT', pt. pp.

UNDERWRITE, v. *ŭn'dėr-rīt':* to subscribe, as one's name to a policy of insurance; to practice insuring. UN'DERWRI'TING, imp.: N. act or practice of insuring ships, goods, etc. (see INSURANCE). UN'DERWRI'TER, n. one who insures ships, goods, etc., for a certain amount in case of loss or damage, by subscribing his name to a formal document, called a policy, in consideration of a certain sum per cent. UN'DERWRIT'TEN, pp.

UNDESCRIBED, a. *ŭn'dĕ-skrībd':* not represented or set forth. UN'DESCRI'BABLE, a. that cannot be described or represented in words.

UNDESERVED, a. *ŭn'dĕ-zėrvd':* not merited. UN'DESER'VEDLY, ad. without desert, either good or evil. UN'DESER'VEDNESS, n. the state or quality of being undeserved. UN'DESER'VER, n. *-vėr,* in *OE.,* one of no merit. UN'DESER'VING, a. not having merit; not having worth. UN'DESER'VINGLY, ad.

UNDESIGNATED, a. *ŭn-dĕs'ĭg-nā-tĕd:* not designated, marked out, or indicated.

UNDESIGNED, a. *ŭn'dĕ-zīnd':* not intended; not proceeding from purpose; unintentional. UN'DESIGN'EDLY, ad. UN'DESIGN'ING, a. not acting with set purpose; upright; having no artful purpose.

UNDESIRABLE, a. *ŭn'dĕ-zī'ră-bl:* not to be wished; that does not please. UN'DESIRED', a. *-zīrd'*, not desired; not solicited. UN'DESI'RING, a. not wishing. UN'DESI'ROUS, a. *-zī'rŭs*, not eager to obtain.

UNDETECTED, a. *ŭn'dĕ-tĕk'tĕd:* not discovered; not laid open.

UNDETERMINED, a. *ŭn'dĕ-tĕr'mĭnd:* not settled or fixed on; undecided.

UNDETERRED, a. *ŭn'dĕ-tĕrd':* not deterred or restrained by fear or obstacles.

UNDEVIATING, a. *ŭn-dē'vĭ-ā-tĭng:* not departing from the way or from principle; steady; regular; unerring. UNDE'VIATINGLY, ad.

UNDEVISED, a. *ŭn'dĕ-vīzd:* not devised or bequeathed.

UNDEVOUT, a. *ŭn'dĕ-vowt':* not devout; without devotion.

UNDID, v. *ŭn-dĭd':* pt. of the verb UNDO (q.v.).

UNDIGESTED, a. *ŭn'dĭ-jĕs'tĕd:* not digested; not dissolved in the stomach, as food.

UNDIGHT, v. *ŭn-dīt'* [*un*, the opposite; AS. *dihtan*, to set in order, to arrange; Ger. *dichten*, to compose]: in *OE.*, to put off, as a part of dress or a personal ornament.

UNDIGNIFIED, a. *ŭn-dĭg'nĭ-fīd:* not marked or not consistent with dignity.

UNDILUTED, a. *ŭn'dī-lū'tĕd:* not rendered more fluid; not weakened in strength.

UNDIMINISHABLE, a. *ŭn'dĭ-mĭn'ĭsh-ă-bl:* not capable of being made less or smaller. UN'DIMIN'ISHED, a. not lessened; not impaired. UN'DIMIN'ISHING, a. not becoming less.

UNDIMMED, a. *ŭn-dĭmd':* not dimmed or obscured.

UNDINE, *ŭn-dēn'* or *ŭn'dēn* [perhaps from *unda*, a wave]: a water-spirit of the female sex. Among all the different orders of elementary spirits, according to Paracelsus, Undines intermarry most readily with human beings, and the U. who gives birth to a child under such a union receives with her babe a human soul. But the man who takes an U. to wife must be careful not to go on the water with her, or at least not to anger her while there, for in that case she will return to her original element. Should this happen, the U. is not disposed to consider her marriage dissolved, but will seek to destroy her husband should he venture on a second marriage. Baron de la Motte Fouqué has made this Paracelsist fancy the basis of his exquisite tale *Undine*.

UNDINTED, a. *ŭn-dĭn'tĕd:* not impressed or hollowed by a blow.

UNDIPLOMATIC, a. *ŭn-dĭp'lō-măt'ĭk:* not according to diplomatic rules; impolitic.

UNDIRECTED, a. *ŭn'dĭ-rĕk'tĕd:* not guided or instructed; not addressed, as a letter.

UNDISCERNED, a. *ŭn'dĭs-zĕrnd':* not discerned or perceived; not seen or observed; not discovered. UN'DISCERN'IBLE, a. that cannot be discerned; invisible. UN'DISCERN'ING, a. not capable of seeing or discriminating; lacking judgment or the power of discrimination; injudicious.

UNDISCHARGED, a. *ŭn'dĭs-chârgd':* not discharged; not freed from any load, burden, or obligation.

UNDISCIPLINED, a. *ŭn-dĭs'sĭ-plĭnd:* not duly exercised and taught; raw; not instructed; not subdued.

UNDISCLOSED, a. *ŭn'dĭs-klōzd':* not disclosed or revealed; not unfolded.

UNDISCOVERABLE, a. *ŭn'dĭs-kŭv'ĕr-ă-bl:* that cannot be found out; that cannot be brought to light. UN'DISCOV'ERED, a. not brought to light; not yet found out.

UNDISCRIMINATING, a. *ŭn'dĭs-krĭm'ĭ-nā-tĭng:* not discriminating.

UNDISGUISED, a. *ŭn'dĭs-gīzd':* not disguised or covered with a mask; open; candid; frank; simple.

UNDISHONORED, a. *ŭn'dĭs-ŏn'ĕrd:* not disgraced.

UNDISMAYED, a. *ŭn'dĭs-mād':* not dismayed or disheartened by fear; not discouraged.

UNDISPOSED, a. *ŭn'dĭs-pōzd':* indisposed; not sold, settled, arranged, or arranged for—always with *of.*

UNDISPUTED, a. *ŭn'dĭs-pū'tĕd:* not disputed or contested; not called in question. UN'DISPU'TEDLY, ad. without question or dispute.

UNDISSEMBLED, a. *ŭn'dĭs-sĕm'bld:* open; undisguised. UN'DISSEM'BLING, a. not exhibiting a false appearance; truthful.

UNDISSIPATED, a. *ŭn-dĭs'sĭ-pā-tĕd:* not scattered; not dispersed.

UNDISSOLVABLE, a. *ŭn'dĭz-zŏl'vă-bl:* that cannot be dissolved or melted; that cannot be loosened. UN'DISSOLVED', a. not dissolved; not melted; not broken; intact. UN'DISSOLV'ING, a. not melting.

UNDISTENDED, a. *ŭn'dĭs-tĕnd'ĕd:* not enlarged.

UNDISTILLED, a. *ŭn'dĭs-tĭld':* not distilled; having the spirit or essence still unextracted.

UNDISTINGUISHABLE, a. *ŭn'dĭs-tĭng'gŭish-ă-bl:* that cannot be distinctly seen; indistinguishable. UN'DISTIN'GUISHABLY, ad. UN'DISTIN'GUISHED, a. not so marked as to be distinctly known; not plainly discerned; not marked by any particular property; not eminent; not treated with any particular respect. UN'DISTIN'GUISHING, a. making no difference; not discriminating.

UNDISTRACTED, a. *ŭn'dĭs-trăk'tĕd:* not distracted; not perplexed by being drawn toward a variety of objects.

UNDISTURBED, a. *ŭn'dĭs-tĕrbd':* free from interruption; unmolested; serene; tranquil; not agitated, as water. UN'DISTURB'ING, a. not molesting.

UNDIVERSIFIED, a. *ŭn'dĭ-vĕr'sĭ-fīd:* not varied; uniform.

UNDIVERTED, a. *ŭn'dĭ-vĕr'tĕd:* not turned aside; not amused.

UNDIVIDABLE, a. *ŭn'dĭ-vī'dă-bl:* that cannot be separated into parts; indivisible. UN'DIVI DED, a. not separated; not separated into parts; unbroken; whole. UN'DIVI DED-LY, ad. so as not to be parted.

UNDIVULGED, a. *ŭn'dĭ-vŭljd':* not revealed or disclosed; kept secret.

UNDO, v. *ŭn-dō':* to reverse what has been done; to annul; to loose; to untie; to unfasten; to unravel; to open; to ruin. UNDO'ING, imp.: N. the reversing of what has been done; ruin. UNDID', pt. UNDONE', pp. annulled; destroyed; ruined, as, he has *undone* all my work: ADJ. not performed; not executed, as, he has left his own work *undone.* UNDO'ER, n. one who undoes; one who destroys.

UNDOCK, v. *ŭn-dŏk':* to take out of dock.

UNDOMESTICATED, a. *ŭn'dō-mĕs'tĭ-kā-tĕd:* not accustomed to a family life; not tamed.

UNDOUBTED, a. *ŭn-dowt'ĕd:* not called in question; admitting no doubt; indisputable; not subjected to suspicion. UNDOUBT'EDLY, ad. without question. UNDOUBT'-ING, a. not hesitating respecting the truth; admitting no doubt; not fluctuating in uncertainty; not wavering. UN-DOUBT'INGLY, ad. UNDOUBT'FUL, a. *-fûl,* not doubtful; plain; evident.

UNDRAPED, a. *ŭn-drāpt':* not covered with drapery; nude.

UNDRAWN, a. *ŭn-drawn':* not pulled by any external force; not allured; not drawn, as liquor from a cask, or a ticket in a lottery; not portrayed.

UNDREAMED, a. *ŭn-drēmd'*, or UNDREAMT', a. *-drĕmt':* not thought of; not dreamed of.

UNDRESS, v. *ŭn drĕs':* to divest of clothes; to strip. UN'DRESS, n. a loose informal dress; not the dress usually and formally worn; ordinary dress, as opposed to 'full dress.' UNDRESS'ING, imp. UNDRESSED', pp.: ADJ. not dressed; not attired; not trimmed; not cooked; not put in order.

UNDRILLED, a. *ŭn-drĭld':* not taught and trained by frequent exercise.

UNDUE, a. *ŭn-dū':* that cannot yet be demanded by right; not legal; improper; excessive; not agreeable to any rule or standard. UNDU'LY, ad. not according to duty or propriety; not in proper proportion; excessively.

ÚNDULATE, v. *ŭn'dū-lāt* [L. *undŭlātus*, diversified as with waves—from *unda*, a wave]: to have a wavy motion; to rise up and down, as waves; to move or play, as curls or waves; to cause to vibrate; to vibrate. UN'DULATING, imp. *-lā-tĭng*, waving: ADJ. wavy; rising and falling, as waves; having a waved surface, as land. UN'DULA'TINGLY, ad. *-lĭ*. UN'DULATED, a. having a waved or ridged surface, as a tract of country. UN'DULA'TION, n. *-lā'shŭn*, a waving motion or vibration; a wavy appearance; alternate elevations and depressions of surface. UN'DULA'TORY, a. *-tėr-ĭ*, resembling the rising and falling motion of waves.

UN'DULATORY THEORY OF LIGHT: the theory that light is due to undulating motion in an ethereal medium. Optics (q.v.) ranks next to Dynamics in the category of nearly *exact* sciences—that is, of sciences whose fundamental principles are so well known that the result of almost any new experimental combination can be predicted mathematically. Given the forces acting on a body, the Laws of Motion (q.v.) enable us, by purely mathematical processes, to determine the consequent motion. The science of Optics awaits, for its full attainment of exactness, some great step in molecular physics which may give us the clue to the nature of the minute motions on which Light, Heat, Electric Currents, and Magnetism depend. In our ignorance of the ultimate nature of matter, we are unable to apply mathematical reasoning with perfect correctness and comprehensiveness.

Optics is divided into two parts, *Physical* and *Geometrical*. Of these, the latter contents itself with assuming certain obvious experimental truths, such as the fact that light in a uniform medium moves in straight lines, the ordinary laws of reflection and refraction, etc., and, making these its basis, employs mathematics to develop their further consequences. It is thus that theory has shown how to carry to their utmost perfection such exquisite specimens of art as the best telescopes and microscopes of the present day. But these investigations, and their practical application, are wholly independent of the *nature* of light, and cannot be affected by discoveries in that direction.

It is otherwise when we come to Physical Optics. This commences with the question: '*What is light?*' and endeavors to deduce from the nature of light the experimental laws which, as we have seen, are assumed as the basis of Geometrical Optics.

By two perfectly distinct classes of astronomical observations—Aberration (q.v.) and the Eclipses of Jupiter's satellites—we know that light takes *time* to pass from one body to another—the velocity, however, being enormous—about 200,000 m. per second. Hence it follows that either *Matter* (q.v.) or *Energy* (see FORCE) must be transferred from a body to the eye before we can see it. Here we have at once the rival physical theories of light, which have alternately had the advantage of one another in explaining observed phenomena. It is only of late years that an *experimentum crucis* has decided between them—

by showing one of them to be utterly incompatible with a result of observation.

Newton adopted the corpuscular theory, in which light is supposed to consist of material particles—i.e., he adopted the first of the two possible hypotheses; and he gave the first instance of the solution of a problem involving molecular forces by deducing from this theory the laws of reflection and single refraction. We shall see immediately that this beautiful investigation led to the destruction of the theory from which it was deduced. But, independent of this, there are many grave and obvious objections to the corpuscular theory; for it involves essentially the supposition of material particles impinging on the eye with the astounding velocity of 200,000 m. per second! If such particles weighed but the millionth of a pound, each would have something like ten times the Momentum (q.v.) (i.e., the battering power) and *six million* times the Vis-viva (see WORK), or kinetic energy (i.e., the penetrating power), of a rifle-bullet. Suppose them a million times smaller—yet as millions of millions of them must be supposed to enter the eye at once, coming from every point of the surface of every visible object, it seems impossible to reconcile such a hypothesis with the excessive delicacy of the organs of vision.

It is not pretended by the advocates of the rival hypothesis, the Undulatory Theory of Light, that they understand exactly the nature of the transference of energy on which they suppose light to depend; but they take from the analogy of sound in air, and of waves in water, the idea of the existence in all space of a highly elastic fluid (or quasi-solid), provisionally named the *Ether* (q.v.), and they suppose light to consist in the propagation of waves in this fluid. Huyghens has the credit of having propounded and ably developed and illustrated this theory.

As we have seen above, the general decision of investigators is that no third hypothesis as to the nature of light is admissible. Many strong arguments against the truth of the corpuscular theory had been furnished by experiment, especially in the early part of the 19th c.; and as they were always met by further and more extraordinary properties which had to be attributed to the luminous corpuscles, the theory had become fearfully complicated; and this of itself was an almost complete disproof. Still, it held its ground; for Newton's old objection to the rival theory—viz., that on the undulatory hypothesis there should be no shadows at all (witness the analogy of sounds heard round a corner)—remained unanswered. This difficulty was overcome by Young (q.v.), to whose sagacity we are indebted for the idea of *Interference* (q.v.), which completely explained the apparent discrepancy. But the question between the rival theories was finally settled by Fizeau and Foucault, who, by processes entirely different, but agreeing in their results, determined the velocity of light in air and in water.

Now, Newton had shown that refraction, such as that of light by water, if predicated of moving *particles*, re-

quires that they should move faster in water than in air. Huyghens, again, had shown that, if such refraction be predicated of *waves*, they must move slower in water than in air. Fizeau and Foucault found, by direct measurement, that light moves slower in water than in air. Hence it is certain that *light consists in the transference of energy, not of matter;* and the Undulatory Theory is based on this fact.

But, as to the manner in which energy is thus transferred, we are entirely ignorant. The common assumption is, that waves of distortion are propagated in the ether: for the nature of this motion, see WAVE. But many other modes have been suggested, one of the most notable of which is that of Rankine. Here the particles of ether are not supposed to be *displaced*, but each is merely made to turn about an axis as the wave of light passes it; the particles having Polarity (q.v.), by virtue of which they arrange themselves in similar positions when no light is passing, and by which, also, any rotation of one particle produces a consequent rotation of those in its neighborhood. For explanation of most of the common phenomena of optics, it is quite indifferent which of these assumptions we make, and, indeed, theory has not yet been carried far enough to enable us to devise experimental methods of testing which is the more likely to represent the fact in nature. It cannot be too strongly insisted on that all at present known is, that light certainly depends on the transference of energy from one part of the luminiferous medium to another; what kind of energy is transferred, vibratory or oscillatory motion, or rotation, etc., is a problem which may possibly forever remain unsolved. But vibratory wave-motion being that with which we are most familiar, as in earthquakes, sound, waves in water, etc., we naturally choose this as the most easily intelligible basis of explanation and illustration. And we shall now briefly show how the laws of linear propagation, reflection, single refraction, interference, diffraction, dispersion, polarization, and double refraction may be accounted for.

We assume, then, that light consists in a succession of waves, and for our earlier inquiries it does not matter whether they be (like those of sound) waves of condensation and rarefaction, in which the vibrations take place *in* the direction of the ray, or (like those in water) waves of distortion or displacement without condensation, in which case the luminous vibrations must be assumed to take place in some direction *perpendicular* to the ray. The phenomena of polarization and double refraction show us that the former of these hypotheses is untenable.

Propagation of Light in a Uniform Isotropic Medium. (An isotropic medium is such that if a cubical portion be taken, it possesses precisely the same properties whatever be the directions of its sides. Glass and water are isotropic, rock-salt and ice are not.)—Suppose AB (fig. 1) to represent at any time the *front* of a plane wave which is passing in the direction CD—i.e., suppose all particles of the ether in the plane AB (perpendicular to the plane of the paper)

to be similarly and equally displaced. According to Huyghens, we must suppose every particle, P, to be itself the source of a wave, which, from the uniformity of the medium, will spread with the same velocity in all directions. With centre P, and radius the space which light passes over in any assigned interval t, describe a sphere represented in section by a circle in the figure. Do the same for adjacent points, P_1, P_2, etc. Let p_1 be the intersection of the circles whose centres are P and P_1, p_2 that of the circles whose centres are P_1 and P_2, and so on. Then, as p_1 is *equidistant* from P and P_1 and (approximately) from all points of a small circular space between P and P_1 on the wave-front AB, all the separate wave-disturbances coming from these points to p_1 will be in the same *phase* (see WAVE), and will therefore combine so as to strengthen each other; while in other directions they will be in different phases, and combine to destroy each other. The locus of all such points as p_1, p_2, etc., will therefore, at the end of the time t, contain all particles of the ether equally and

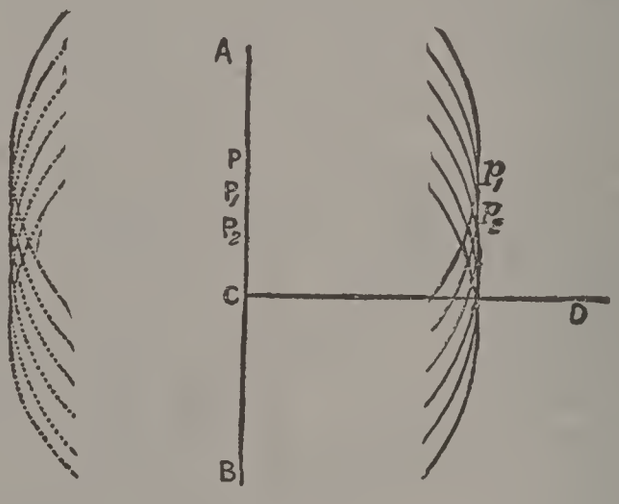


Fig. 1.

similarly disturbed, and will thus be the new wave-front. But it is obviously a plane parallel to AB. Also the disturbance at P has passed to p_1; and, when the distance PP_1 is taken as very small, Pp_1 is perpendicular to the wave-front AB. Hence, in such a medium, a plane wave remains plane, and moves with uniform velocity in a direction perpendicular to its front. [There is a difficulty as to what becomes of the disturbance, which, according to Huyghens's assumption, ought to travel *back* into the dotted portions of the spheres; and it is not easy to account for the absence of this on mechanical principles. But we are content here to take for granted that no waves are propagated backward from the main wave, as a fact clearly proved by experiment.] Since a small portion of the surface of any curved wave may be considered as plane, we now see how any such wave will be propagated in an isotropic medium. Erecting perpendiculars at every point of the surface of the curved wave, and laying off along these lines the space which light passes over in a given interval,

the extremities form a new surface, which is the wave-front after the lapse of that interval.

Reflection at a Plane Surface.—Suppose AB (fig. 2) to be a plane wave-front, moving in the direction Bb perpen-

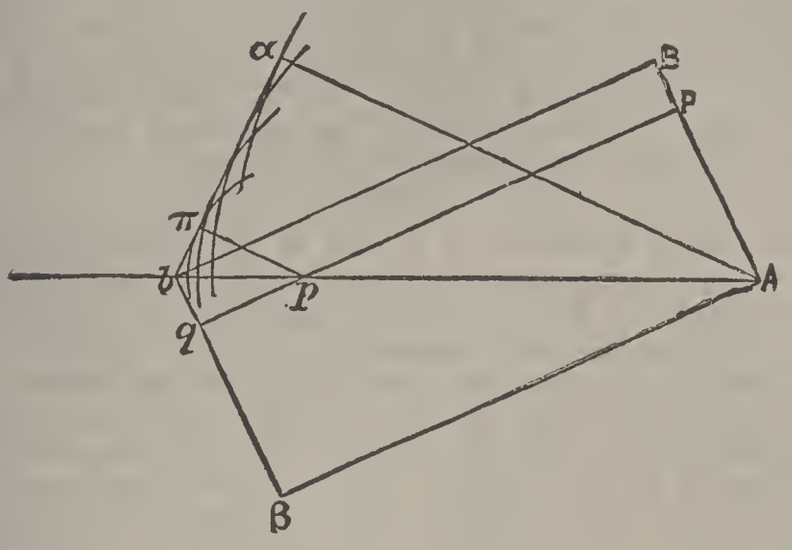


Fig. 2.

dicular to AB. Let Ab be the reflecting surface, and let the intersection of the plane of the wave-front with the reflecting surface be a line through A perpendicular to the paper. When B has arrived at b, A would have arrived at β, and P at q (where $b\beta$ is parallel to BA, and Pq and Aβ to Bb), had it not been for the reflecting surface.

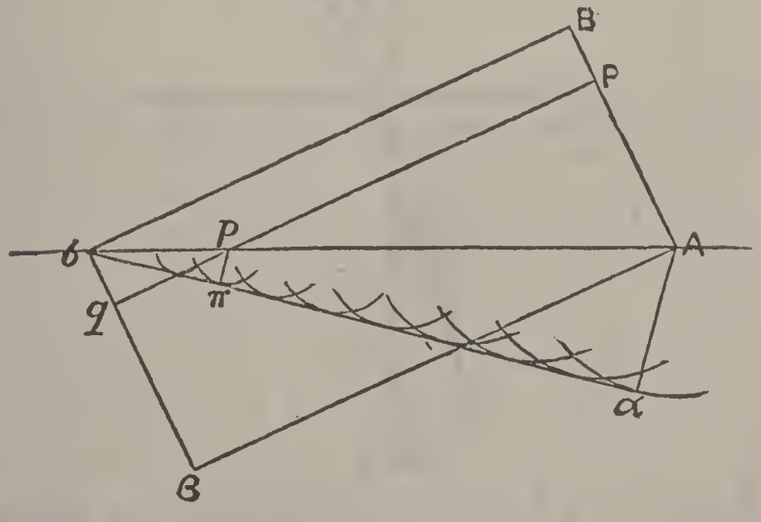


Fig. 3.

Hence, when B is at b, A has diverged into a sphere of radius Aβ, P from p into a sphere of radius pq; and so for each point of the wave-front. Now, the spheres so described about A and p as centres obviously touch the plane $b\beta$; consequently they touch the other plane $b\alpha$, which makes the angle A$b\alpha$ equal to A$b\beta$. Now, $b\pi\alpha$ is the front of the reflected wave, and Aα is the direction in which it is proceeding. Hence, obviously, the ordinary laws of reflection. See CATOPTRICS.

Refraction at a Plane Surface into an Isotropic Medium.—Here we take account of the change of velocity which light suffers in passing from one medium to another. In fig. 3, A, P, B, b, p, q, and β represent the same as before—but suppose Aα now to represent the space through which the wave travels in the second medium, while it would travel from B to b in the first. With centre A and radius Aα, describe a sphere. Let $b\alpha$ touch this sphere in α. Then $b\alpha$ is the front of the refracted wave. For, if $p\pi$ be drawn perpendicular to $b\alpha$, we have

$$p\pi : A\alpha :: bp : bA :: pq : A\beta.$$

Hence, while A travels to α, and B to b, P travels to p, and thence to π. And the sines of the angles BAb and A$b\alpha$, which are the angles of incidence and refraction, are to each other as Bb to Aα—i.e., as the velocity in the first medium is to that in the second. See DIOPTRICS.

It is obvious from the cut, that, the *less* is the velocity in the second medium, the more nearly does the refracted ray enter it at right angles to its surface. As a contrast, we introduce here a sketch of Newton's admirable investigation of the same problem on the corpuscular hypothesis. Let AB (fig. 4) be the common surface of the two media,

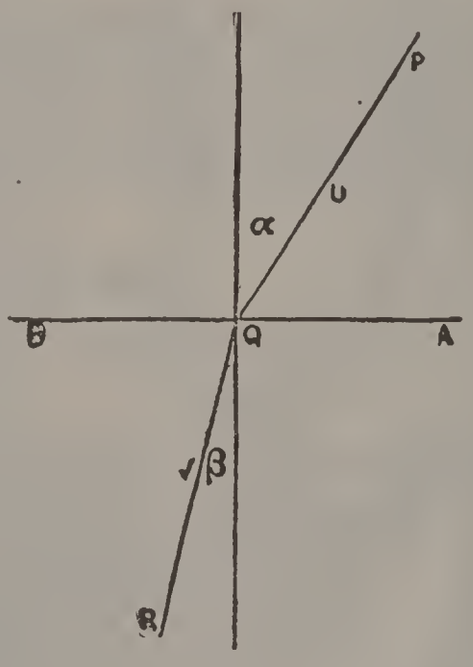


Fig. 4.

PQR the path of a corpuscle. Let U and V be the velocities in the two media, α and β the angles of incidence and refraction. Then, the forces which act on the corpuscle being entirely perpendicular to the refracting surface, the velocity *parallel* to that surface is not altered. This gives

$$U \sin. \alpha = V \sin. \beta.$$

Also the kinetic energy is increased by the loss of potential energy in passing from the one medium to the other. Hence the square of V exceeds that of U by a quantity which depends only on the nature of the two media and of the corpuscle. This shows that V is the same whatever

be the direction of the ray, and then the first relation proves that the sines of the angles of incidence and reflection are *inversely* as the velocities in the two media—i.e., the refracted ray is more nearly perpendicular to the refracting surface the *greater* is the velocity in the second medium. It is very singular that two theories so widely dissimilar should each give the true *law* of refraction; and, in connection with what has just been said, it may be mentioned that on the corpuscular theory a corpuscle passes from one point to another with the least *action*, while on the Undulatory Theory it passes in the least *time* Hamilton's (q.v.) grand principle of *Varying Action* includes both of these.

Interference.—Fresnel's mode of exhibiting this phenomenon (whose discovery is due to Young) is very simple and striking. An isosceles prism of glass, with an angle very nearly 180°, is placed, as in fig. 5, symmetrically in front of a brilliant point (e.g., the image of the sun formed by a lens of very short focus). The effect of the prism is that light which passes from O through the portion QR appears to have come from some point such as A (the

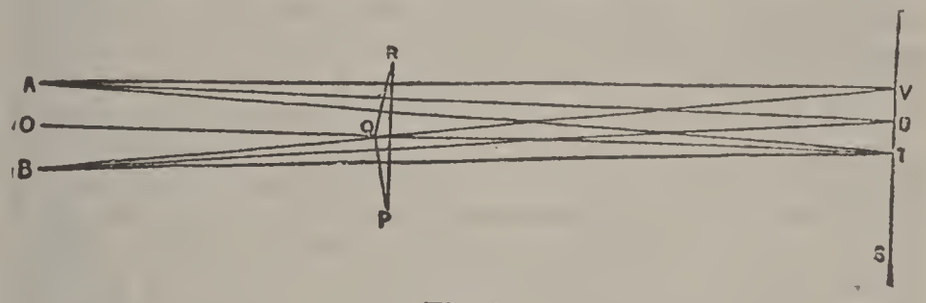


Fig. 5.

image of O as seen through the upper half of the prism). Similarly, the light which has passed through PQ appears to come from some point B. The light which has passed through the prism is to be received on a white screen ST. At the point T, which is in the prolongation of the line OQ, the distances TA and TB are equal; but for no other point, as U, in the line ST, are UA and UB equal. Suppose U and V to be such that UA and UB differ in length by half a wave-length of some particular color, VA and VB by a whole wave-length of the same; then waves arriving at T, as if from A and B, have passed over equal spaces; consequently their crests coincide, so that at T they reinforce each other. But at U a hollow from A is met by a crest from B, so that darkness is the result. At V, again, crest and crest coincide. And so on. Hence, if we are experimenting with one definite color of light, the effect on the screen is to produce at T, V, etc., bright bands of that color, all parallel to the edges of the prism PQR. At points like U there are dark bands. And the length of a wave can easily be calculated from this experiment; for the lengths of OQ and QT can be measured, and, knowing the angles of the prism and its refractive index (see REFRACTION) for the particular color employed, we can calculate the positions of A and B. We have then only to measure the dis-

tance TV between the centres of the two adjoining bright bars, and then geometry enables us to calculate the difference of the lengths of VA and VB, which, as we have seen, is the length of a wave. The results of this experiment show how very minute are these wave-lengths for visible rays. Thus, for

	Inch.
Extreme Red, the wave-length in air is	0·0000266
" Violet, " " "	0·0000167

These are, roughly, the $\frac{1}{40000}$ and the $\frac{1}{60000}$ of an inch. Inasmuch, then, as light describes 200,000 m. per second, the number of waves which enter the eye per second are-

Extreme Red, . .	460 millions of millions.
" Violet, . .	730 " "

These numbers, compared with those of sonorous waves (see SOUND), show the extraordinary difference in delicacy between the optic and auditory nerves. But whereas the range of the ear is somewhere about 12 octaves, that of the eye is less than one.

Diffraction.—(See this title.)

Dispersion.—We have just now seen that, by Fresnel's interference experiment, waves of different lengths are separated (for in the last figure the position of the bright line V depends on the length of the waves which produce it). But the different colors also are separated by common refraction, as in Newton's celebrated experiment: see SPECTRUM. This shows, of course, that, in refracting media, waves of different colors move with different velocities; and, as the violet are more refracted than the red, it appears that the shorter waves move more slowly in glass or water than the longer ones. In free space, waves of all lengths travel with equal speed, else (see ABERRATION) all stars ought to appear drawn out into spectra, in consequence of the earth's annual motion. Also, a star suddenly breaking out, or suddenly vanishing (a phenomenon several times observed), should flash out first red, and gradually become white, or should gradually decay from white to violet—which is not observed to be the case. These facts are the most difficult to explain of any to which the Undulatory Theory has yet been applied. Fresnel, indeed, appears to have been in possession of a solution of the difficulty; but the Appendix to one of his papers, to which he more than once refers as containing this explanation, was not found among his MSS. Cauchy and others have, however, by delicate investigations, shown that, *if the forces exerted by the molecules of a refracting body on the ether are exerted through distances comparable with the length of a wave*, the velocity of light will then depend on the wave-length. The velocity is, in fact, shown to be represented by a formula such as this:

$$A - \frac{B}{\lambda^2},$$

where A and B are constant quantities for a given medium, and λ is the length of a wave. The larger λ is, the less

is the second term of the formula, and therefore the velocity is the greater. A very singular result follows from this formula—viz., that the velocity becomes more and more nearly equal to A as the wave-length is greater. Hence waves of low radiant heat, which (see HEAT) are merely waves of light which are incapable of producing vision, must be crowded together toward a limit, not very far beyond the red end of the spectrum.

Polarization.—We now come to a set of phenomena which give further information as to the nature of luminiferous waves. When two beams of light, such as those in Fresnel's experiment, are polarized in planes perpendicular to each other (see POLARIZATION) before they meet, *they do not interfere.* This is in accordance with the assumption required for the explanation of the existence of polarization itself—viz., that the vibrations of the ether take place *transversely* to the direction of the ray.

Double Refraction.—Our assumptions, forced upon us by experimental results, are now so far complete that we may proceed, after Fresnel, to apply them to the explanation of double refraction: see POLARIZATION: REFRACTION, DOUBLE. This explanation is extremely beautiful, and when published was justly hailed as the greatest step in physical science which had been made since Newton deduced the facts of physical astronomy from the law of gravitation.

As we have seen above, in treating of simple reflection and refraction, that the form and velocity in and with which a disturbance spreads from any point of a wave are all that is required for determination of the course of a ray, we must endeavor to find the form in which a disturbance spreads in a double-refracting crystal; and this should lead us to a construction for each of the two rays.

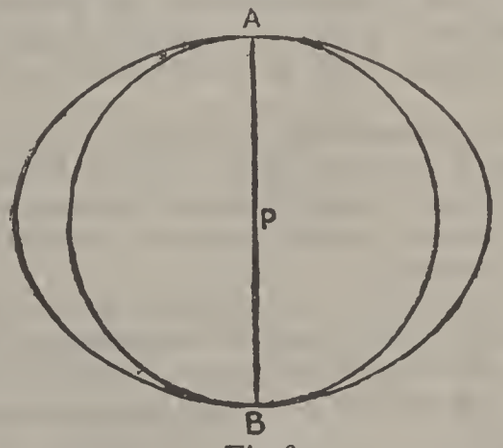


Fig. 6.

Huyghens had already pointed out that one of the two rays produced by Iceland-spar follows the ordinary law of refraction. Hence the disturbances which give rise to this ray are propagated in spherical waves in the crystal. He showed also that the other ray could be accounted for if the disturbances to which it is due were propagated in the form of an oblate spheroid touching the sphere with the extremities of its axis, that axis being parallel to the crystallographic axis of the mineral. The above dia-

gram (fig. 6) will make this clear: P is the point where the ether is disturbed. Two waves spread from P in the form shown in the cut, the line APB being the axis of rotation of the spheroid, and parallel to the axis of the crystal. Thus, let rays αA, etc. (fig. 7), of which AB is the wave-front, fall upon the surface Ab of such a crystal; and let AC be the direction of its axis. Draw, about A as

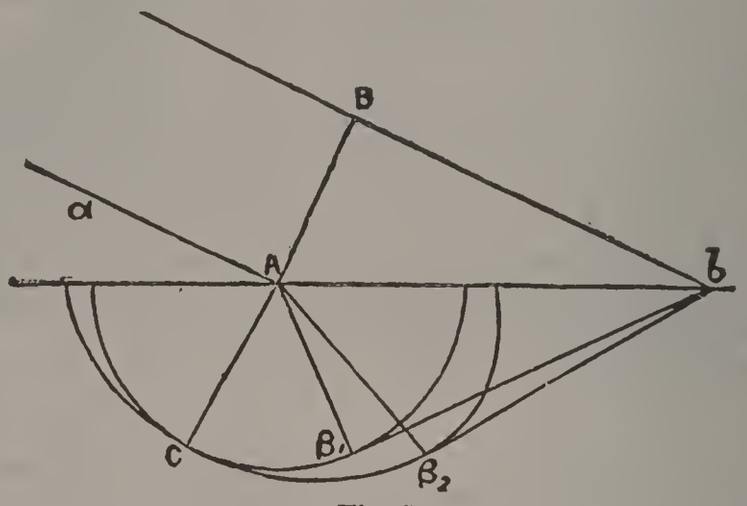


Fig. 7.

centre, the sphere and spheroid into which the disturbance at A spreads in the crystal while light in air passes from B to b. Then if planes be drawn through the line b (perpendicular to the paper) so as to touch the sphere in β_1 and the spheroid in β_2, these planes will touch respectively all the intermediate spheres and spheroids produced by disturbances at points between A and b. [This is evident from simple geometry.] Thus, $b\beta_1$ and $b\beta_2$ are the new wave-fronts; and the ray αA, falling on the crystal, is divided into the two Aβ_1 and Aβ_2. Of these, Aβ_1 is the ordinary ray, and, being produced by spherical waves, has all the properties of a ray ordinarily refracted. It obviously moves perpendicularly to its front, as Aβ_1 is perpendicular to $\beta_1 b$.

But it is otherwise with Aβ_2, which is, in general, *not perpendicular to its front*, $\beta_2 b$. Again, if AC, the axis of the crystal, be not in the plane of incidence, the ray Aβ_2 is not in that plane; so that here we have *refraction out of the plane of incidence.*

The exact accordance of this construction with observation was proved by the careful experiments of Wollaston. We have to add only that the two rays Aβ_1 and Aβ_2 are, in all cases, completely polarized in planes at right angles to each other.

The experiments of Brewster showed that in far the greater number of minerals and artificial crystals *both* rays are extraordinary—i.e., neither of them can be accounted for by disturbances propagated spherically in the crystal. But no tentative process could lead to the form of the wave-surface in this most general case. Here Fresnel's genius supplied the necessary construction.

He assumes that the ether in a crystallized body is possessed of different rigidity, or different inertia, in different

directions—a supposition in itself extremely probable, from the mechanical and other properties of crystals. In the general case there are shown to be three principal directions in a crystal, in any one of which, if the ether be displaced, the resulting elastic force is in the direction of the displacement. Each of these is, in all cases, perpendicular to the others. Any given displacement of the ether corresponds to partial calculable displacements parallel to each of these lines; thus the elastic force consequent on any displacement whatever is known if we know those for the three rectangular directions. All the calculations are thus dependent on *three* numbers only, for each substance.

To find the form in which a disturbance will spread, Fresnel proceeds as follows: Let the plane of the paper represent the front of a wave in the crystal, and suppose a particle of ether to be displaced in it from A to B (fig. 8). This displacement may be resolved (by the law of the parallelogram of velocities, forces, etc.) into two components in any two directions in the plane of the paper. Assume

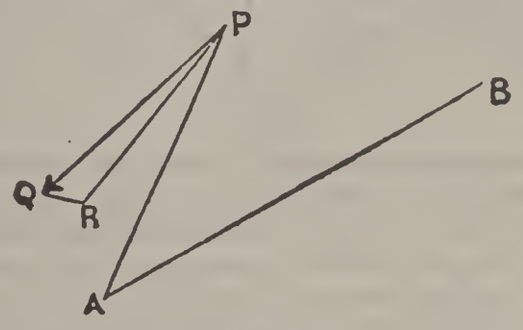


Fig. 8.

AP to be one of these, and let PQ be the force produced by disturbing the particle of ether from A to P. In general, PQ will *not* lie in the plane of the paper. Let fall a perpendicular, QR, upon the plane of the paper. In general, the point R will not lie in AP. The portion RQ of the elastic force of the ether, Fresnel neglects, because it would produce vibrations perpendicular to the wave-front—i.e., *similar to those of sound*—and he assumes that such normal vibrations do not produce visible light. We shall recur to this point. Fresnel now assumes that the vibrations which will be propagated continuously in the crystal are such as have PR coincident in direction with AP; and then the rate of their propagation will depend on the ratio of PR to PA. He shows by mathematical reasoning that there are *two* such directions in every wave-front, and that they are always *perpendicular* to each other. This, of course, at once accounts for double refraction, the complete polarization of each of the two rays, and their being polarized in planes perpendicular to each other. The original plane wave is now broken into two, both parallel to the first, but in general moving at different rates. He next considers a disturbance at any point in a crystal as equivalent to waves having fronts in *every* plane passing through that point, and investigates mathematically the form of the surface which is touched by the planes of all the pairs of polarized rays which have (in any given time)

proceeded from each of those wave-fronts. The form of this surface is very remarkable: it is symmetrical with reference to three planes at right angles to each other. These, of course together, cut it into eight parts, one of which is figured below (fig. 9). From this it appears, though Fresnel did not perceive it, that the surface has four *conical cusps*, as they are called, the inner portion

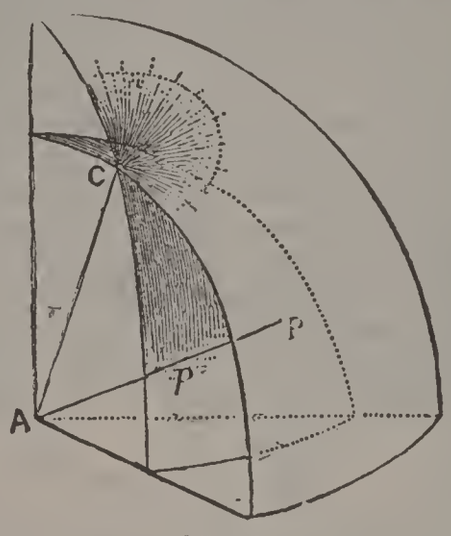


Fig 9.

seeming to be drawn through a hole, as it were, and then spreading out again to form the outer portion: the external appearance of these points resembles the portion of an apple round the point of attachment of the stalk. Fresnel showed that, in particular cases, when two of the three principal elasticities are equal, this surface degenerates into the sphere and spheroid of Huyghens above described for Iceland-spar; and that, when all three are equal, it becomes a single sphere, as in glass, water, and other singly refracting bodies. All this, of course, is in complete accord with experiment. But there is vastly more. If we use the wave-surface of Fresnel to construct the refracted rays, just as we employed the sphere for simple refraction, or the sphere and spheroid for Iceland-spar, we find generally *two* definite refracted rays (both usually out of the plane of incidence) for one incident ray. But Hamilton (q.v.), the first to perceive the existence of the cusps above described, saw that they indicated the existence of a very remarkable phenomenon, to which he gave the name Conical Refraction (q.v.). The ray which, in the crystal, passes from A to C (the cusp—see last figure), has not, like other rays such as A*p*P, two definite wave-fronts. For if at *p* and P, where the line A*p*P meets the inner and outer portions of the wave-surface, we draw tangent planes, these are the definite fronts of the corresponding waves; so that such a ray will split into two only, on leaving the crystal. But AC intersects the surface at C, where it is *conical*, and has an *infinite* number of tangent planes; so that when it leaves the crystal it will split into an infinite number, forming a hollow cone. Hamilton's prediction then was: If a single ray of light be made to pass through a plate of a biaxal crystal in the direction AC (limiting it, for instance;

by sheets of tinfoil with small holes in them properly fixed on each side), it will enter and emerge as a hollow cone. Also the plane of polarization will differ for different rays in this cone. Lloyd completely verified this wonderful prediction by experiments made with a plate of *Arragonite* (q.v.). But more, Hamilton observed that (see last figure) the wave-surface can be touched by a tangent plane in a circle surrounding the cusp. If, then, we make the construction of fig. 7 with Fresnel's wave instead of the sphere and spheroid, there will be a definite direction of the incident ray αA, for which the tangent planes $b\beta_1$ and $b\beta_2$ in that figure will coincide, and will touch the wave-surface in the circle about the cusp. Any line drawn from A to a point in that circle will be a direction for a refracted ray. Hence the ray αA will be broken up into a hollow cone of rays, the vertex of the cone being A, and its base this circle. If the crystal be cut into a plate, each ray will of course emerge parallel to αA, and the *ensemble* of them will form a hollow cylinder. The prediction then is that a single definite ray, falling in a given direction on such a plate of crystal, will emerge as a hollow cylinder. This, and the predicted laws of the polarization of the light of the cylinder, also were verified by Lloyd.

'The formulæ which led to such triumphantly successful predictions *may* have been deduced from incomplete or even erroneous premises; but they *represent a truth*, and must in time conduct us step by step back to ultimate proof of the truth of Fresnel's assumptions, and of the Undulatory Theory of Light, as now understood, or show us what modifications may be required in the original conceptions.'

It would unduly lengthen this article, and besides would lead us into discussions far too recondite for a work like this, to enter upon the question of whether the vibrations in polarized light are *perpendicular to* or *in* the plane of polarization—a subject recently well investigated by Stokes (q.v.); or to consider the production of elliptically polarized light by reflection at the surface of metals, diamond, etc.; and various other important points of the theory. We only mention that Green, Cauchy, Stokes, and others, who have entered deeply into the mechanical question of luminiferous vibrations, have found themselves obliged to take into account the *Normal* wave, which, as we have seen, Fresnel neglected.

Fluorescence (see PHOSPHORESCENCE), Spectrum Analysis (see SPECTRUM), and various other important recent additions to the theory can be merely mentioned; as also the very remarkable observation of Maxwell which appears to connect Light and Electricity, and was derived from a theory which assumes the ether to be the vehicle of Electricity and Magnetism as well as of Light and Heat, and by which it appears that the velocity of Light is expressible in terms of the static and kinetic units of Electricity (q.v.).

For some recent metaphysical and experimental suggestions opposed to the Undulatory Theory, see SUBSTANTIALISM.

For further information, the general reader may consult Lloyd's *Wave-theory*, an excellent elementary treatise: while the mathematician may consult Airy's *Tract on the Undulatory Theory;* and Herschel's article 'Light' in *Encyclopædia Metropolitana.*

UNDULY: see under UNDUE.

UNDUTIFUL, a. *ŭn-dū'tĭ-fûl:* not obedient; wanting in respect and duty. UNDU'TIFULLY, ad. UNDU'TIFULNESS, n. want of respect; disobedience. UNDU'TEOUS, a. *-t'yus*, in *OE.*, not performing one's duty; disobedient.

UNDY, a. *ŭn'dĭ* [from L. *unda*, a wave]: in *her.*, wavy: see HERALDRY.

UNDYING, a. *ŭn-dī'ĭng:* not subject to death; not perishing; enduring; immortal.

UNEARNED, a. *ŭn-ėrnd':* not earned or obtained by labor or merit.

UNEARNED'-IN'CREMENT: in *polit. econ.*, the increase in the value of land produced without labor or expenditure on the part of the owner—e.g., by the growth of a town in its vicinity. John Stuart Mill and his followers contend that this increment should belong to the nation.

UNEARTH, v. *ŭn-ėrth':* to drive from the earth or from a burrow; to uncover; to expose. UNEARTHED', a. *-ėrthd'*, driven from the earth or from a den or burrow; freed from the cover of earth, as roots; discovered or exposed to view. UNEARTH'LY, a. not of earth; supernatural.

UNEASY, a. *ŭn-ē'zĭ:* restless; disturbed; constrained; disagreeable; feeling some degree of pain or discomfort. UNEA'SILY, ad. with a certain degree of pain. UNEA'SINESS, n. restlessness; disquietude.—SYN. of 'uneasy': painful; disturbed; constraining; cramping; constrained; awkward; stiff; peevish; difficult.

UNEATH, ad. *ŭn-ēth'* [see EATH]: in *OE.*, not easily; scarcely: ADJ. in *OE.*, uneasy; difficult.

UNEBBING, pp. *ŭn-ĕb'bĭng:* not receding, as the ebb of the tide.

UNEDIFYING, a. *ŭn-ĕd'ĭ-fī-ĭng:* not edifying or improving to the mind. UNED'IFIED, a. not improved or instructed in mind or disposition.

UNEDUCATED, a. *ŭn-ĕd'ū-kā-tĕd:* illiterate; ignorant.

UNEFFACED, a. *ŭn'ĕf-fāst':* not effaced, as from the mind; not obliterated or destroyed, as a writing or a figure on the surface of a thing.

UNEFFECTUAL, a. *ŭn'ĕf-fĕk'tū-ăl:* ineffectual.

UNELECTED, a. *ŭn'ĕ-lĕk'tĕd:* not chosen; not preferred.

UNEMBARRASSED, a. *ŭn'ĕm-băr'răst:* not perplexed or confused in mind or deportment; free from pecuniary difficulties or incumbrances.

UNEMBITTERED, a. *ŭn'ĕm-bĭt'tėrd:* not rendered distressing; not exasperated.

UNEMBODIED, a. *ŭn'ĕm-bŏd'ĭd:* free from a corporeal body; not collected or formed into a body, as troops.

UNEMOTIONAL, a. *ŭn'ē-mō'shŭn-ăl:* not subject to emotion.

UNEMPHATIC, a. *ŭn'ĕm-făt'ĭk:* not characterized by emphasis or expressiveness. UN'EMPHAT'ICALLY, ad. without energy or emphasis.

UNEMPLOYED, a. *ŭn'ĕm-ploydʹ:* not occupied; without employment; at leisure; not engaged in work; not in use.

UNEMPOWERED, a. *ŭn'ĕm-pow'rd:* not empowered or authorized.

UNENCUMBERED, a. *ŭn'ĕn-kŭm'bĕrd:* not encumbered or burdened, as an estate by mortgages, annuitants, debts, etc.

UNENDING, a. *ŭn-ĕndʹĭng:* not coming to an end; not terminating; everlasting.

UNENDOWED, a. *ŭn'ĕn-dowdʹ:* not endowed, as with talent; not supplied with a permanent fund.

UNENDURABLE, a. *ŭn'ĕn-dū'ră-bl:* not to be endured; intolerable.

UNENGAGED, a. *ŭn'ĕn-gājdʹ:* not bound by promise, as to marry; free from obligation; not occupied. UN'ENGA'GING, a. not adapted to win the affections; not inviting.

UNENGLISH, a. *ŭn-ĭngʹglĭsh:* not according to English character in speech or action.

UNENJOYED, a. *ŭn'ĕn-joydʹ:* not obtained or enjoyed; not possessed with satisfaction.

UNENLARGED, a. *ŭn'ĕn-lârjdʹ:* not increased in bulk or extent.

UNENLIGHTENED, a. *ŭn'ĕn-līt'nd:* not enlightened.

UNENLIVENED, a. *ŭn'ĕn-līv'nd:* not enlivened or animated.

UNENSLAVED, a. *ŭn'ĕn-slāvdʹ:* not in bondage; free.

UNENTANGLED, a. *ŭn'ĕn-tăngʹgld:* not entangled; not confused or disordered; not involved; not complicated

UNENTERTAINING, a. *ŭn-ĕn'tĕr-tān'ĭng:* not entertaining or amusing.

UNENTHRALLED, a. *ŭn'ĕn-thrawldʹ:* not enslaved or reduced to thraldom.

UNENVIABLE, a. *ŭn-ĕn'vĭ-ă-bl:* not capable of exciting envy; not desirable; wretched or embarrassing, as an *unenviable* position. UNEN'VIED, a. exempt from the envy of others. UNEN'VIOUS, a. free from envy.

UNEQUABLE, a. *ŭn-ĕk'wă-bl:* different at different times; not uniform.

UNEQUAL, a. *ŭn-ē'kwŏl:* not even; not of the same size, age, etc.; inferior; inadequate; insufficient; ill-proportioned; ill-matched; not regular or uniform; in *OE.*, unjust. UNE'QUALLED, a. unparalleled; unrivalled. UNE'QUALLY, ad. in different degrees; in *OE.*, unjustly.

UNEQUIVOCAL, a. *ŭn'ĕ-kwĭv'ō-kăl:* not doubtful; clear; evident; not of doubtful signification. UN'EQUIV'OCALLY, ad. UN'EQUIV'OCALNESS, n. the state of being unequivocal.

UNERRING, a. *ŭn-ĕr'rĭng:* committing no mistake; incapable of error; certain; sure. UNER'RINGLY, ad. in an unerring manner; without mistake.

UNESPIED, pp. *ŭn'ĕs-pīd':* not seen; undiscovered; undescried.

UNESSAYED, a. *ŭn'ĕs-sād':* unattempted.

UNESSENTIAL, a. *ŭn'ĕs-sĕn'shăl:* not absolutely necessary; not necessary to the existence of a thing; unimportant.

UNEVANGELICAL, a. *ŭn'ē-văn-jĕl'ĭ-kăl:* not according to the gospel as interpreted by different sects, or by a party in a church.

UNEVAPORATED, a. *ŭn'ĕ-văp'ō-rā-tĕd:* that has not passed off in vapor; not dissipated.

UNEVEN, a. *ŭn-ē'vn:* not even or level; not uniform, as temper; not of equal length; in *OE*, incongruous; unsuitable; troublesome. UNE'VENLY, ad. UNE'VENNESS, n. the state of not being level; want of uniformity or levelness.

UNEXAGGERATED, a. *ŭn'ĕgz-ăj'ĕr-ā-tĕd:* not enlarged beyond the truth.

UNEXALTED, a. *ŭn'ĕgz-awl'tĕd:* not raised high; not elevated in power.

UNEXAMINED, a. *ŭn'ĕgz-ăm'ĭnd:* not inquired into or investigated; not interrogated.

UNEXAMPLED, a. *ŭn'ĕgz-ăm'pld:* having no example or similar case; unprecedented.

UNEXCELLED, a. *ŭn'ĕk-sĕld':* not excelled or surpassed.

UNEXCEPTIONABLE, a. *ŭn'ĕk-sĕp'shŭn-ă-bl:* not liable to any exception; unobjectionable.

UNEXCITED, a. *ŭn'ĕk-sī'tĕd:* not roused or stirred up.

UNEXCLUDED, a. *ŭn'ĕks-klō'dĕd:* not hindered; not debarred.

UNEXECUTED, a. *ŭn-ĕks'ĕ-kū-tĕd:* not performed; not signed or sealed, as a deed.

UNEXEMPLIFIED, a. *ŭn'ĕgz-ĕm'plĭ-fīd:* not illustrated by example.

UNEXERCISED, a. *ŭn-ĕks'ĕr-sīzd:* not exercised; not practiced; not disciplined.

UNEXERTED, a. *ŭn'ĕgz-ĕr'tĕd:* not called into action; not enforced.

UNEXHAUSTED, a. *ŭn'ĕgz-awst'ĕd:* not all used or spent.

UNEXPECTED, a. *ŭn'ĕks-pĕk'tĕd:* not looked for; sudden; taken by surprise. UN'EXPEC'TEDLY, ad. at a time or in a manner not looked for; suddenly. UN'EXPEC'TEDNESS, n. the quality of being unexpected. UN'EXPEC'TANT, a. not expectant.

UNEXPIRED, a. *ŭn'ĕks-pīrd':* not ended; that has not come to an end through lapse of time; still in existence or force.

UNEXPLAINABLE, a. *ŭn'ĕks-plān'ă-bl:* not capable of being made plain to the understanding; inexplicable. UN'EXPLAINED', a. not made plain or intelligible.

UNEXPLORED, a. *ŭn'ĕks-plōrd':* not searched out or examined; unknown.

UNEXPLOSIVE, a. *ŭn'ĕks-plō'sĭv:* not explosive.

UNEXPORTED, a. *ŭn'ĕks-pōrt'ĕd:* not sent out of a country.

UNEXPOSED, a. *ŭn'ĕks-pōzd':* not laid open to view; concealed.

UNEXPOUNDED, a. *ŭn'ĕks-pownd'ĕd:* not explained or interpreted.

UNEXPRESSED, a. *ŭn'ĕks-prĕst':* not expressed or put in words; not mentioned or named. UN'EXPRES'SIVE, a. not representing with force; not emphatic; in *OE.*, unutterable; ineffable.

UNEXPUNGED, a. *ŭn'ĕks-pŭnjd':* not expunged or blotted out; not obliterated.

UNEXTENDED, a. *ŭn'ĕks-tĕnd'ĕd:* having no dimensions; occupying no assignable space.

UNEXTINGUISHABLE, a. *ŭn'ĕks-tĭng'gwĭsh-ă-bl:* that cannot be extinguished; that cannot be quenched. UN'EXTIN'GUISHED, a. not quenched; not entirely repressed.

UNEXTORTED, a. *ŭn'ĕks-tŏrt'ĕd:* spontaneous; not drawn out by force or compulsion.

UNFABLED, a. *ŭn-fā'bld:* not fictitious; real; true.

UNFADED, a. *ŭn-fā'dĕd:* not having lost its strength or color; not withered. UNFA'DING, a. not liable to lose its freshness; not transient; not liable to wither. UNFA'DINGNESS, n. the quality of being unfading.

UNFAILING, a. *ŭn-fāl'ĭng:* not liable to fail; not capable of being exhausted; certain. UNFAIL'INGLY, ad.

UNFAIR, a. *ŭn-fär':* not impartial; using trick or artifice; trickish; dishonest; not just. UNFAIR'LY, ad. not in a just manner. UNFAIR'NESS, n. dishonesty of conduct or practice; the state or quality of being not honorable or candid in one's dealings; injustice.

UNFAITHFUL, a. *ŭn-fāth'fûl:* inconstant; not observant of promises; violating trust or confidence; negligent of duty; in *OE.*, impious; infidel. UNFAITH'FULLY, ad. UNFAITH'FULNESS, n. neglect or violation of vows or promises; breach of confidence or trust reposed; in *OE.*, impiety.

UNFALTERING, a. *ŭn-fawl'tĕr-ĭng:* not failing; not hesitating.

UNFAMILIAR, a. *ŭn'fă-mĭl'yĕr:* not rendered agreeable by frequent use; not accustomed; not known or acquainted with. UN'FAMIL'IAR'ITY, n. the state of being unfamiliar.

UNFASHIONABLE, a. *ŭn-făsh'ŭn-ă-bl:* not according to the prevailing mode; not regulating dress, etc., according to the reigning custom. UNFASH'IONABLENESS, n. neglect of the prevailing mode. UNFASH'IONABLY, ad.

UNFASHIONED, a. *ŭn-făsh'ŭnd:* not fashioned or modified by art; not having a regular form.

UNFASTEN, v. *ŭn-făs'n:* to loose; to unbind; to untie; undo the fastenings of. UNFAST'ENED, pp. loosed; untied.

UNFATHERED, a. *ŭn-fâth'ĕrd:* having no father. UNFATH'ERLY, a. unkind; not becoming a father.

UNFATHOMABLE, a. *ŭn-făth'ŭm-ă-bl:* that cannot be fathomed or sounded by line; too deep for measuring. UNFATH'OMABLY, ad. UNFATH'OMED, a. that has not been fathomed; exceedingly deep.

UNFAVORABLE, a. *ŭn-fā'vĕr-ă-bl:* not disposed to countenance; not kind or obliging; not propitious; discouraging; in *OE.*, ill-looking. UNFA'VORABLY, ad. UNFA'VORABLENESS, n. the quality of being unfavorable; want of disposition to countenance or support. UNFA'VORED, a. not favored or assisted.

UNFEARED, a. *ŭn-fērd':* not feared or dreaded.

UNFEASIBLE, a. *ŭn-fē'zĭ-bl:* impracticable.

UNFEATHERED, a. *ŭn-fĕth'ĕrd:* having no feathers; unfledged.

UNFEED, a. *ŭn-fēd'* [*un*, and *fee*]: not having received a fee; unpaid.

UNFEELING, a. *ŭn-fēl'ĭng:* void of sensibility; cruel; callous. UNFEEL'INGLY, ad. UNFEEL'INGNESS, n.

UNFEIGNED, a. *ŭn-fānd'* or *ŭn-fān'ĕd:* not counterfeit; real; sincere. UNFEIGN'EDLY, ad. without hypocrisy; sincerely.

UNFELT, a. *ŭn-fĕlt':* not felt; not perceived.

UNFEMININE, a. *ŭn-fĕm'ĭ-nĭn:* not according to the female character or manners.

UNFENCED, a. *ŭn-fĕnst':* uninclosed by a fence.

UNFERMENTED, a. *ŭn'fĕr-mĕnt'ĕd:* that has not undergone the process of fermentation; unleavened.—UNFERMENTED BREAD, bread made without yeast or other fermentative. The dietetic advantages of the form of unfermented bread known as aërated bread are considered to be its perfect cleanness and purity, its light and uniform texture, and its sweet and agreeable flavor; also the fact that it retains much of the ingredients of the wheat which enter into the formation of blood and muscle, and are allowed to escape in fermented bread. It is recommended for ordinary diet, particularly in cases of indigestion, flatulence, etc.—See AËRATED BREAD.

UNFETTER, v. *ŭn-fĕt'tėr:* to loose from fetters or bonds; to free from restraint. UNFET'TERED, pp.: ADJ. free from restraint.

UNFIGURED, a. *ŭn-fĭg'ūrd:* plain; not covered or adorned with figures.

UNFILIAL, a. *ŭn-fĭl'ĭ-ăl:* undutiful; not becoming a child.

UNFILLED, a. *ŭn-fĭld':* not filled; not fully supplied.

UNFINISHED, a. *ŭn-fĭn'ĭsht:* not complete; not brought to an end; wanting the last touch.

UNFIT, a. *ŭn-fĭt':* unsuitable; unqualified; unworthy; incompetent: V. to disable; to disqualify. UNFIT'TING, imp.: ADJ. disqualifying; unbecoming; improper. UNFIT'TED, pp. disqualified; rendered unsuitable. UNFIT'LY, ad. UNFIT'NESS, n. want of suitable powers or qualifications; want of propriety or adaptation to character or place.

UNFIX, v. *ŭn-fĭks':* to remove, as a bond or fastening; to loose from that which fastens; to unsettle. UNFIX'ING, imp. UNFIXED', pp.: ADJ. wandering; inconstant; having no settled object. UNFIX'EDNESS, n. the state of being unfixed or unsettled.

UNFLAGGING, a. *ŭn-flăg'gĭng:* not drooping; maintaining strength or spirit.

UNFLATTERING, a. *ŭn-flăt'tėr-ĭng:* not concealing the truth; not gratifying with obsequious behavior.

UNFLEDGED, a. *ŭn-flĕjd':* not yet furnished with feathers; not having attained to full growth.

UNFLESHED, a. *ŭn-flĕsht':* not seasoned to blood; untried.

UNFLINCHING, a. *ŭn-flĭnsh'ĭng:* not shrinking; resolute.

UNFOILED, a. *ŭn-foyld':* not vanquished.

UNFOLD, v. *ŭn-fōld':* to expand; to open; to spread out; to lay open to view; to disclose; to reveal. UNFOLD'ING, imp.: N. the act of expanding or disclosing. UNFOLD'ED, pp.

UNFOLD, v. *ŭn-fōld':* to set free from a fold, as sheep.

UNFORBIDDEN, a. *ŭn'fŏr-bĭd'n:* not prohibited; allowed.

UNFORCED, a. *ŭn-fōrst':* not constrained; not urged or impelled; not feigned; natural; not violent.

UNFORESEEN, a. *ŭn'fōr-sēn':* not seen or known beforehand.

UNFORETOLD, a. *ŭn'fōr-tōld':* not predicted.

UNFOREWARNED, a. *ŭn'fōr-wawrnd':* not previously warned or admonished.

UNFORGETFUL, a. *ŭn'fŏr-gĕt'fŭl:* not forgetful.

UNFORGIVEN, a. *ŭn'fŏr-gĭv'n:* not pardoned. UNFORGIV'ING, a. not disposed to overlook or pardon offenses: implacable.

UNGODLY, a. *ŭn-gŏd'lĭ:* wicked; impious; neglecting the worship of God. UNGOD'LINESS, n. disregard of God and His commands.

UNGORED, a. *ŭn-gōrd':* not gored; unwounded; unhurt by horn or spear.

UNGORGED, a. *ŭn-gŏrjd':* not filled; not sated.

UNGOT, a. *ŭn-gŏt'*, or UNGOTTEN, pp. *ŭn-gŏt'n:* not acquired; in *OE.*, not begotten.

UNGOVERNABLE, a. *ŭn-gŭv'ĕrn-ă-bl:* that cannot be governed or restrained; unruly. UNGOV'ERNABLY, ad. UNGOV'ERNABLENESS, n. the quality of not being able to be restrained; unruliness. UNGOV'ERNED, a. not subjected to laws or principles; not restrained or regulated.

UNGRACED, a. *ŭn-grāst':* not embellished or dignified; not honored. UNGRACE'FUL, a. not marked with ease and dignity; wanting beauty and elegance, as manner. UNGRACE'FULLY, ad. awkwardly; inelegantly. UNGRACE'FULNESS, n. want of ease or dignity; awkwardness.

UNGRACIOUS, a. *ŭn-grā'shŭs:* offensive; unpleasing; odious; hateful. UNGRA'CIOUSLY, ad.

UNGRAMMATICAL, a. *ŭn'grăm-măt'ĭ-kăl:* not in accordance with the rules of grammar. UN'GRAMMAT'ICALLY, ad.

UNGRANTED, a. *ŭn-grănt'ĕd:* not conceded; not bestowed or conferred.

UNGRATEFUL, a. *ŭn-grāt'fûl:* not thankful or showing gratitude, as for favors conferred or kindness shown; not agreeable; unpleasing, as sounds or speech. UNGRATE'FULLY, ad. UNGRATE'FULNESS, n. the state of being ungrateful for favors received; ill return for a kindness; unpleasantness.

UNGRATIFIED, a. *ŭn-grăt'ĭ-fid:* not pleased or satisfied; not indulged.

UNGRAVELY, ad. *ŭn-grāv'lĭ:* without seriousness.

UNGROUNDED, a. *ŭn-grownd'ĕd:* having no foundation or support; unfounded; false.

UNGRUDGED, a. *ŭn-grŭjd':* given willingly. UNGRUDG'ING, a. freely giving. UNGRUDG'INGLY, ad.

UNGUAL, a. *ŭng'gwăl* [L. *unguis*, a nail, a claw]: pertaining to, of the nature of, or shaped like a nail, claw, or hoof; having a nail, claw, or hoof attached. UN'GUICAL, a. *-gwĭ-kăl*, pertaining to or like a claw. UNGUIC'ULAR, a. *-gwĭk'ū-lĕr*, formed as a nail or claw. UNGUIC'ULATE, a. *-lāt*, or UNGUIC'ULATED, a. *-lā-tĕd*, having claws; in *bot.*, applied to petals which have an unguis or stalk. UNGUIFORM, a. *ŭng'gwĭ-fawrm* [L. *forma*, shape]: claw-shaped. UN'GUIS, n. *-gwĭs*, UN'GUES, n. plu. *-gwēz* [L.]: a claw; in *bot.*, the narrowed part of the base of a petal.

UNGUARDED, a. *ŭn-gârd'ĕd:* not watched; not defended; not attentive to danger; not cautious; inconsiderate. UNGUARD'EDLY, ad. UNGUARD'EDNESS, n. the state of being unguarded.

UNGUENT, n. *ŭng'gwĕnt* [L. *unguentum*, an ointment, a perfume—from *ungo*, I besmear: F. *onguent:* It. *unguento:* comp. Gael. *ung*, to anoint]: a soft composition used externally for the cure of sores, burns, and the like; an ointment. UN'GUENTARY, a. *-gwĕn-tĕr-ĭ*, or UNGUENT'OUS, a. *-gwĕnt'ŭs*, partaking of the qualities of an unguent. —*Unguents* or ointments consist of some active agent in solution, or in the form of a soft extract, or in fine powder, carefully rubbed up with some fatty matter or mixture of several such matters, e.g., prepared lard, prepared suet, white wax, yellow wax, olive-oil, and almond-oil. There are many ointments enumerated in the *Pharmacopœia*. Some, e.g., ointments of aconitia, atropia, and belladonna, are employed to allay neuralgia and local pains; simple ointments (consisting of white wax, prepared lard, and almond-oil) are employed in dressing raw and blistered surfaces; ointments of cantharides and of savin are used to keep up the discharge from issues or blistered surfaces; ointments of creosote, galls, carbonate of lead, oxide of zinc, etc., serve as astringents; ointments of ammoniated mercury, calomel, nitrate and red iodide of mercury, iodine, iodide of potassium, elemi, resin, and turpentine, act as astringents of varying power; and ointment of red oxide of mercury as a mild caustic. Many of the ointments are of special service in skin-diseases, and sulphur ointment is the specific application for itch.

UNGUESSED, a. *ŭn-gĕst':* not reached by conjecture; unsuspected.

UNGUICAL, UNGUICULAR, UNGUICULATE, UNGUIS, etc.: see under UNGUAL.

UNGUICULATA, *ŭn-gwĭk-ū-lā'ta*, in Zoology: a section of the class Mammalia, consisting of animals which have toes furnished with nails or claws. In the system of Linnæus, it includes the orders *Bruta*, *Glires*, *Primates*, and *Feræ;* in that of Cuvier, the orders *Bimana*, *Quadrumana*, *Carnaria*, *Marsupialia*, *Rodentia*, and *Edentata*. See UNGUAL.

UNGUIDED, a. *ŭn-gī'dĕd:* not guided or directed; not regulated.

UNGUILTY, a. *ŭn-gĭl'tĭ:* not guilty; innocent.

UNGULA, a. *ŭng'gū-lă* [L. *ungŭla*, a hoof—from *unguis*, a claw]: a hoof; a hoof-shaped section of a cylinder, cone, or the like, cut off by a plane oblique to the base. UN'GULATE, a. *-lāt*, or UN'GULATED, a. *-lā-tĕd*, hoof-shaped; having the digits inclosed in hoofs. UNGULATA, n. plu. *ŭng'gū-lā'tă*, or UN'GULATES, *-lāts*, the order of mammals which includes the hoofed quadrupeds, classed as *Perissodactyla* and *Artiodactyla* (see these titles: also FOOT: PACHYDERMATA: ZOOLOGY). UN'GULOUS, a. *-lŭs*, pertaining to or resembling a hoof. UN'GULITE-GRIT, *-līt-grĭt* [L. *ungŭla*, a hoof; Eng. *grit*]: in *geol.*, a series of greenish-colored shales and grits occurring near St. Petersburg, so called because their prevailing shell is the *obolus* or *ungula*, a nail-shaped brachiopod.

UNGULED, *ŭng'gūld*, in Heraldry: having hoofs of a tincture different from that of the rest of the bearing.

UNGVAR, or UNGHVAR, *ông'vâr* or *ông-vâr':* important market-town in n.e. Hungary, charmingly situated on the river Ungh, 90 m. n.n.e. of Debreczin. It is the seat of a bp., and has a very old castle, a beautiful church, a seminary and gymnasium. Trade is carried on in salt, cattle, and particularly wine, vines being extensively cultivated in the vicinity. Pop. (1880) 11,373.—U. is also the name of a county or district; about 1,200 sq. m. (pop. 130,000).—Pop. of town (1836) 13,460.

UNHABITABLE, a. *ŭn-hăb'ĭ-tă-bl:* in *OE.*, that cannot be dwelt in; not fit for abode; uninhabitable.

UNHABITUATED, a. *ŭn'hă-bĭt'ū-ā-tĕd:* not accustomed.

UNHACKED, a. *ŭn-hăkt':* not notched or hacked; not hewn.

UNHACKNEYED, a. *ŭn-hăk'nĭd:* not hackneyed; not worn by use and repetition.

UNHALLOWED, a. *ŭn-hăl'lōd:* profane; unholy; impure.

UNHAND, v. *ŭn-hănd':* to loose from the hand; to let go.

UNHANDLED, a. *ŭn-hăn'dld:* not touched; not treated or discoursed on.

UNHANDSOME, a. *ŭn-hănd'sŭm:* awkward; unmanageable; inconvenient; not beautiful; ungraceful; hence, unbecoming; uncivil; illiberal; unfair. UNHAND'SOMELY, ad. ungracefully; inelegantly; illiberally. UNHAND'SOMENESS, n. want of beauty and elegance; unfairness; incivility; illiberalness.

UNHANDY, a. *ŭn-hăn'dĭ:* not skilful and ready in the use of the hands; awkward; not convenient. UNHAN'DILY, ad. awkwardly; clumsily. UNHAN'DINESS, n. want of dexterity; awkwardness.

UNHANG, a. *ŭn-hăng':* to divest of hangings, as a room; to take from the hinges, as a door. UNHANGED', or UNHUNG', a. not put to death by hanging.

UNHAPPY, a. *ŭn-hăp'pĭ:* not happy; more or less miserable or wretched; unfortunate; bringing ill fortune; wretched; evil; calamitous; in *OE.*, mischievous. UNHAP'PILY, ad. unfortunately; miserably; in *OE.*, mischievously. UNHAP'PIED, a. *-pĭd*, in *OE.*, made unhappy. UNHAP'PINESS, n. misfortune; misery; wretchedness.

UNHARASSED, a. *ŭn-hăr'ăst:* not harassed; not fatigued with bodily labor or with care; at ease.

UNHARBORED, a. *ŭn-hâr'bĕrd:* not sheltered.

UNHARDENED, a. *ŭn-hâr'dnd:* not hardened; not made firm or compact; not made obdurate, as the heart.

UNHARDY, a. *ŭn-hâr'dĭ:* not hardy or courageous; not able to endure fatigue; feeble.

UNHARMED, a. *ŭn-hârmd':* unhurt; uninjured.

UNHARMONIOUS, a. *ŭn'hâr-mō'nĭ-ŭs:* not harmonious; incongruous; discordant. UN'HARMO'NIOUSLY, ad.

UNHARNESS, v. *ŭn-hâr'nĕs:* to loose from harness or gear; to divest of armor. UNHAR'NESSING, imp. UNHAR'NESSED, pp.

UNHATCHED, a. *ŭn-hăcht':* not hatched; immature; not disclosed.

UNHAUNTED, a. *ŭn-hânt'ĕd:* not haunted; not frequented or resorted to; solitary.

UNHAZARDED, a. *ŭn-hăz'ẽrd-ĕd:* not hazarded; not put in danger; not exposed to loss.

UNHEALTHY, a. *ŭn-hĕl'thĭ:* not healthy; unsound; sickly. UNHEALTH'FUL, a. injurious to health; unwholesome. UNHEALTH'FULLY, ad. UNHEALTH'ILY, ad. in an unwholesome manner. UNHEALTH'INESS, n. the quality or condition of being unhealthy.

UNHEARD, a. *ŭn-hẽrd':* not heard; not perceived by the ear; unknown to fame; obscure. UNHEARD OF, unprecedented.

UNHEART, v. *ŭn-hârt':* in *OE.*, to discourage; to depress.

UNHEATED, a. *ŭn-hēt'ĕd:* not made hot.

UNHEAVENLY, a. *ŭn-hĕv'n-lĭ:* not heavenly.

UNHEDGED, a. *ŭn-hĕjd':* not surrounded by a hedge; not fenced in.

UNHEEDED, a. *ŭn-hēd'ĕd:* disregarded; neglected. UNHEED'FUL, a. inattentive; careless. UNHEED'FULLY, ad. UNHEED'ING, a. careless; negligent. UNHEED'INGLY, ad. UNHEED'Y, a. *-hēd'ĭ,* in *OE.*, precipitate; sudden.

UNHELE, v. *ŭn-hēl'* [*un,* not; AS. *helan,* to conceal]: in *OE.*, to uncover.

UNHELM, v. *ŭn-hĕlm':* to remove or deprive of a helm or helmet. UNHELMED, pp. a. *ŭn-hĕlmd',* deprived of a helm or helmet; being without a helmet.

UNHELPED, a. *ŭn-hĕlpt':* having no aid or helper; unsupported. UNHELP'FUL, a. *-fûl,* giving no assistance.

UNHEPPEN, a. *ŭn-hĕp'pĕn* [*un,* not; AS. *hæp,* fit]: in *prov. Eng.*, ugly; awkward; deformed; misshapen.

UNHEROIC, a. *ŭn'hē-rō'ĭk:* not heroic; not brave.

UNHESITATING, a. *ŭn-hĕz'ĭ-tā-tĭng:* not remaining in doubt; prompt; ready. UNHES'ITATINGLY, ad.

UNHEWN, a. *ŭn-hūn':* not dressed, as stone; rough.

UNHINDERED, a. *ŭn-hĭn'dẽrd:* not hindered or opposed.

UNHINGE, v. *ŭn-hĭnj':* to take from the hinges; to unfix; to loosen; to disorder; to trouble; to unsettle; to incapacitate. UNHING'ING, imp. UNHINGED', pp. loosed from the hinges; unsettled; deranged.

UNHISTORICAL, a. *ŭn'hĭs-tŏr'ĭ-kăl:* not pertaining to or contained in history.

UNHIVE, v. *ŭn-hīv':* to drive from a hive; to deprive of a habitation.

UNHOARD, v. *ŭn-hōrd':* to dissipate or scatter that which has been hoarded.

UNHOLY, a. *ŭn-hō'lĭ:* profane; not holy; not hallowed or consecrated; impious; wicked; impure; not ceremonially purified. UNHO'LILY, ad. in an unholy manner. UNHO'LINESS, n. impiety; an unsanctified state of the heart; profaneness.

UNHONORED, a. *ŭn-ŏn'ẽrd:* not honored; not regarded; not held in high estimation; not celebrated.

UNHOOK, v. *ŭn-hûk':* to loose or detach from a hook.

UNHOPED, a. *ŭn-hōpt':* not expected; not so probable as to excite hope—usually with *for*, as an *unhoped-for* success. UNHOPE'FUL, a. leaving no room for hope. UNHOPE'FULLY, ad.

UNHORSE, v. *ŭn-hŏrs':* to throw or drag from a horse; to cause to dismount. UNHORSED', pp. thrown from a horse. UNHORS'ING, imp. throwing from a horse; dismounting.

UNHOUSE, v. *ŭn-howz':* to drive from a house or habitation. UNHOUSED', pp. a. expelled from a house or shelter; houseless; destitute of shelter; having no settled habitation.

UNHOUSELED, or UNHOUSELLED, a. *ŭn-how'zẽld* [see HOUSEL]: not having received the Eucharist.

UNHUMBLED, a. *ŭn-hŭm'bld:* not humbled; not ashamed; not contrite in spirit.

UNHUNG: see under UNHANG.

UNHUNTED, a. *ŭn-hŭnt'ĕd:* not hunted; not pursued with hounds, as game.

UNHURT, a. *ŭn-hẽrt':* not injured; not harmed. UNHURT'FUL, a. harmless. UNHURT'FULLY, ad.

UNHUSBANDED, a. *ŭn-hŭz'bănd-ĕd:* without or deprived of a husband; not husbanded or managed with frugality.

UNHUSK, v. *ŭn-hŭsk':* to free from husks. UNHUSKED', a. freed from the husk. UNHUSK'ING, n. the process of freeing grain or other corn from the husk.

UNI-, prefix, *ū'nĭ* [L. *ūnus*, one]: a prefix signifying *only one* or *producing one*.

UNIATS, *ū'nĭ-ăts*, or U'NIATES, *-āts:* members of a Greek or Oriental chh. in communion with the see of Rome and detached from a schismatical parent chh. There are Greek U., Chaldean U., and Armenian U. (see UNITED ARMENIANS). The Uniate Greeks proper employ the Basilian or the Chrysostoman liturgy in Greek. The Uniate Bulgarians, Ruthenians, and Roumanians use the Greek liturgy translated into their own languages. See GREEK CHURCH—*United Greeks*. There are about 12,000 Greek Uniats in the United States—nearly all Ruthenians and Roumanians.

UNIAXIAL, a. *ū'nĭ-ăk'sĭ-ăl* [L. *ūnus*, one, and Eng *axis*]: having but one axis.

UNICELLULAR, a. *ū'nĭ-sĕl'ū-lẽr* [L. *ūnus*, one, and Eng. *cellular*]: composed of one cell.

UNICLINAL, a. *ū'nĭ-klī'năl* [L. *ūnus,* one; Gr. *klinō,* I bend, I lean]: in *geol.,* inclining in one direction; monoclinal.

U'NICORN: a fabulous animal, described in ancient accounts as a native of India, with the body of a horse but of larger size, and with one horn of 1½ to 2 cubits in length on its forehead, perfectly straight, with a white base, black middle, and red tip. The unicorn was adopted as a supporter of the royal Scottish arms, from which it has been introduced as the left supporter of the British arms, and has in this form been imported into India.

UNICORN-FISH: See FILE-FISHES.

UNICORN PLANT: one of the popular names of plants of the genus *Martynia,* glandular, pubescent, and fetid herbs, natives of America. They have irregular funnel-form corollas, with oblique tubes, and limbs which are slightly two-lipped. The flowers are velvety, yellowish-white and purple-mottled, and borne in racemes on a decumbent stem possibly two feet long in the devil's horns (*M. louisiana*), common in the southwestern United States, and occasionally escaped from gardens. The leaves vary from ovate to orbicular, sometimes undulate at the edges, and the fruits are four-celled, 4 to 5 inches long, oblong, and prolonged into a curved point, much longer than the body. At maturity the rather fleshy, outer, green layer of the fruit disappears, and leaves the woody part of the pods, which ultimately splits into two valves, that are very tough and black, and sometimes as much as 13 inches long. These tapering horns are moistened and split by the Indian women of the Southwest, who weave them into their baskets, as the black element necessary in their color-scheme of decoration. The plant itself often serves as a motif for the design.

UNICORN-ROOT: a graceful, smooth plant (*Chamælirium luteum*) of the bunch-flower family. It has a tuft of radical spatulate foliage and stem-leaves which are narrow. The flowers are small and white, with a perianth of six segments, and are diœcious, in long racemes. The staminate racemes, nodding at first, eventually stand straight; fertile ones are always erect. The fertile plants are sometimes three feet high. The tuberous rootstocks are bitter, and an infusion of them is a popular tonic and anthelmintic, and is said to be a large ingredient of certain patent medicines. One of the industries of the mountaineers of the southern Alleghanies is that of digging up these roots. This *Chamælirium* is also known as devil's bit, or blazing star. The latter name being more generally and correctly applied to the stargrass (*Aletris farinosa*), which is a similar plant, having a bitter-tuberous rhizome.

UNICOSTATE, a. *ŭ'nĭ-kŏs'tāt* [L. *ūnus,* one; *costa,* a

rib]: in *bot.*, having a single rib or costa in the middle, called the midrib—applied to leaves.

UNIDEAED, a. *ŭn'ī-dē'ăd:* having no idea; inane.

UNIDEAL, a. *ŭn'ī-dē'ăl:* not ideal; real.

UNI-EQUIVALENT, *ū'nĭ-ē-kwĭv'ă-lĕnt:* in *chem.*, applied to an element whose atom is supposed to have only one combining power.

UNIFACIAL, a. *ū'nĭ-fā'shal* [L. *ūnus,* one; *facĭēs,* the face]: having only one face or front surface.

UNIFICATION, UNIFIED: see under UNIFY.

UNIFLORAL, a. *ū'nĭ-flo'răl* [L. *ūnus,* one; *flos* or *flōrem,* a flower]: having but one flower.

UNIFORM, a. *ū'nĭ-fawrm* [F. *uniforme*—from L. *unĭformis,* having only one form or shape—from *ūnus,* one; *forma,* shape]: having always the same form, manner, or character; not different; not variable; regular; equable; undeviating; consistent; homogeneous: N. [F. *uniforme,* a uniform]: an official or state dress; the particular style of dress as regards form, fashion, color, etc., which is worn, or prescribed to be worn officially by members of the same service or body, as in the army, navy, police, by railway employés, etc. Compulsory uniforms came in with the institution of standing armies. Soldiers serving with corps were dressed after their own fancy well into the 17th c.; in the British navy, uniforms were not fixed with certainty until the reign of George III. Blue is the prevailing color in military and naval uniforms, the police, etc., though ornamented and 'faced' differently in different countries, and in different corps, as well as in different ranks. Scarlet may be said to be (for coats) the prevailing uniform of the British army, though some regiments wear other colors (e.g., the rifles green and the artillery blue). Blue is the prevailing color of the German army uniform; in the French army, blue is used for coats and red for breeches. U'NIFORMLY, ad. *-lĭ,* without variation. U'NIFOR'MITY, n. *-fŏr'mĭ-tĭ,* constant resemblance to itself; sameness; unvaried likeness; resemblance in shape and character, as between the corresponding parts of a subject in the fine arts. U'NIFORM'NESS, n. *-nĕs,* the state of being uniform; uniformity. ACTS OF UNIFORMITY, the acts of parliament which regulate the rites and forms of the Church of England, Elizabeth 1559, Charles II. 1662 (see NONCONFORMISTS).

UNIFORMITARIANISM: Huxley's name for the Lyellian doctrine of uniformity of geologic processes and results in all ages of the earth's history. In other words this doctrine teaches that the forces operative upon and within the earth to-day, were active in former geologic times, and produced the same results, and to them alone are due the structural features of the earth and not to catastrophic revolutions.

UNIFY, v. *ū'nĭ-fī* [L. *ūnus*, one; *facĭō*, I make]: to reduce to unity or uniformity. U'NIFYING, imp. U'NIFIED, pp. *-fīd:* ADJ. made uniform and of one denomination instead of several; consolidated. U'NIFICA'TION, n. *-fi-kā'shŭn*, reduction to unity or uniformity.

UNIGENITURE, n. *ū'nĭ-jĕn'ĭ-tūr* [L. *ūnus*, one; *genĭtus*, pp. of *gigno*, I produce, bring forth]: the state of being the only-begotten. U'NIGEN'ITUS, a. *-ĭ-tŭs* [L.]: only-begotten.

UNIGEN'ITUS, BULL: celebrated bull issued by Pope Clement XI., which began with the word 'Unigenitus,' and which formally condemned a work written by Quesnel, entitled *Réflexions Morales*, reviving the essential principles of Jansenism (q.v.). The book was at first simply prohibited by a brief of Pope Innocent XI. 1708; but, as it found many patrons, especially the abp. of Paris, Cardinal de Noailles, it was deemed necessary to subject it to a more detailed examination, the result of which was that 101 propositions were extracted from it, and formally condemned 1713 by this famous bull. The mode of condemning these propositions was peculiar, being that technically called *Damnatio in globo*. The whole body of propositions was condemned as 'heretical,' 'false,' 'rash,' 'scandalous,' 'offensive to pious ears,' etc.; without, at the same time, any particular propositions being pointed out as deserving any one of these specific forms of censure. This circumstance, with others, gave rise to much controversy, and to a prolonged opposition to the bull. De Noailles and other bishops refused to accept it unless with certain qualifications; on the contrary, Louis XIV. insisted on unconditional acceptance; but on the death of Louis, the regent (Duke of Orleans) having given his countenance to the opponents of the bull, the resistance was persisted in; and eventually a declaration was put forth, 1717, by four bishops, appealing from the pope to a general council. This appeal was condemned by the pope, nor was it countenanced even by the regent; but a more modified appeal, 'from the pope ill-informed to the pope better-informed,' was afterward published by De Noailles, which obtained many adherents, and by which the opposition was kept alive till the end of the pontificate of Clement XI. 1721, and even under his successors, Innocent XIII. and Benedict XIII. It was not till 1730 that, after the formal registration of the Bull Unigenitus by the parliament of Paris, the party thus created in France, and known under the name of 'Appellants,' received its final condemnation from the civil authority, after which it gradually died out, though some relics of it are still traceable, even after all the storms of the Revolution, in the so-called 'Petite Église.' See GALLICAN CHURCH.

UNIGENOUS, a. *ū-nĭj'ĕ-nŭs* [L. *ūnus*, one; *genus*, a kind]: of one or the same kind or genus.

UNIJUGATE, a. *ū-nĭj'ū-gāt* [L. *ūnus*, one; *jugum*, a yoke]: in *bot.*, applied to a pinnate leaf having one pair of leaflets.

UNILABIATE, a. *ū'nĭ-lā'bĭ-āt* [L. *ūnus*, one, and *labĭum*, a lip]: in *bot.*, having one lip only.

UNILATERAL, a. *ū'nĭ-lăt'ėr-ăl* [L. *ūnus*, one; *latus*, a side, *latĕris*, of a side]: having but one side; arranged on one side or turned to one side.

UNILITERAL, a. *ū'nĭ-lĭt'ėr-ăl* [L. *ūnus*, one; *litĕra*, a letter]: consisting of one letter only.

UNILLUMINATED, a. *ŭn'ĭl-lō'mĭ-nā-tĕd:* dark; ignorant.

UNILOCULAR, a. *ū'nĭ-lŏk'ū-lėr* [L. *ūnus*, one; *locŭlus*, a little place—from *locus*, a place]: having a single division or cavity; one-celled.

UNIMAGINABLE, a. *ŭn'ĭm-ăj'ĭn-ă-bl:* not to be conceived. Un'imag'inably, ad. Un'imag'inative, a. not imaginative. Un'imag'ined, a. not conceived.

UNIMITATED, a. *ŭn-ĭm'ĭ-tā-tĕd:* not imitated.

UNIMPAIRED, a. *ŭn'ĭm-pārd':* not impaired; not enfeebled.

UNIMPASSIONED, a. *ŭn'ĭm-păsh'ŭnd:* not endowed with passions; cool; calm; not vehement.

UNIMPEACHABLE, a. *ŭn'ĭm-pēch'ă-bl:* that cannot be accused; free from stain or fault. Un'impeach'ableness, n. *-nĕs*, the state or quality of being unimpeachable. Un'impeached', a. not charged or accused.

UNIMPEDED, a. *ŭn'ĭm-pē'dĕd:* not impeded or hindered.

UNIMPLORED, a. *ŭn'ĭm-plōrd':* not solicited.

UNIMPORTANT, a. *ŭn'ĭm-pawrt'ănt:* not important; insignificant. Un'import'ance, n. *-ăns*, want of importance.

UNIMPORTUNED, a. *ŭn-ĭm'pŏr-tūnd':* not importuned.

UNIMPOSING, a. *ŭn'ĭm-pō'zĭng:* not imposing; not adapted to impress forcibly.

UNIMPRESSIBLE, a. *ŭn'ĭm-prĕs'sĭ-bl:* not impressible. Un'impressed', a. not impressed; not awakened or aroused; not fixed deep in the mind. Un'impres'sive, a. not forcible; not adapted to awaken the passions. Un'impres'sively, ad.

UNIMPROVABLE, a. *ŭn'ĭm-prôv'ă-bl:* not capable of improvement by culture or tillage. Un'improved', a. not improved; not advanced in knowledge or excellence; not profited by; not tilled. Un'improv'ing, a. not tending to advance or instruct.

UNIMUSCULAR, a. *ū'nĭ-mŭs'kū-lėr* [L. *ūnus*, one; *muscŭlus*, a muscle]: applied to a bone having one muscle only, and one muscular impression.

UNINCLOSED, a. *ŭn'ĭn-klōzd':* not inclosed.

UNINCORPORATED, a. *ŭn'ĭn-kŏr'pō-rā-tĕd:* not united in one body; not blended.

UNINCUMBERED, a. *ŭn'ĭn-kŭm'bėrd:* not burdened; free from mortgage or other incumbrance or charge.

UNINDORSED, a. *ŭn'ĭn-dôrst':* not indorsed or assigned.

UNINFECTED, a. *ŭn'ĭn-fĕkt'ĕd:* not infected; not contaminated by foul air; not corrupted. UN'INFEC'TIOUS, a. *-fĕk'shŭs*, not foul; not capable of communicating disease.

UNINFESTED, a. *ŭn'ĭn-fĕst'ĕd:* not infested.

UNINFLAMED, a. *ŭn'ĭn-flāmd':* not inflamed; not set on fire; not highly provoked. UN'INFLAM'MABLE, a. not inflammable; that cannot be set on fire.

UNINFLUENCED, a. *ŭn-ĭn'flû-ĕnst:* not influenced; not persuaded or moved by others; acting freely. UNIN'FLUEN'TIAL, a. not possessing influence.

UNINFORMED, a. *ŭn'ĭn-fawrmd':* not instructed; untaught; not suffused with life or color.

UNINHABITABLE, a. *ŭn'ĭn-hăb'ĭ-tă-bl:* unfit to be dwelt in by men. UN'INHAB'ITED, a. not dwelt in by men; without inhabitants.

UNINITIATED, a. *ŭn'ĭn-ĭsh'ĭ-ā-tĕd:* not initiated.

UNINJURED, a. *ŭn-ĭn'jûrd:* not hurt; suffering no harm.

UNINSCRIBED, a. *ŭn'ĭn-skrībd':* not inscribed; not marked with letters or characters.

UNINSPIRED, a. *ŭn'ĭn-spīrd':* not inspired; not having received any supernatural instruction or illumination.

UNINSTRUCTED, a. *ŭn'ĭn-strŭkt'ĕd:* not educated; not furnished with instructions or directions. UN'INSTRUC'TIVE, a. not conferring improvement.

UNINSULATED, a. *ŭn-ĭn'sū-lā-tĕd:* not insulated; not separated or detached.

UNINSURED, a. *ŭn'ĭn-shôrd':* not secured against loss, as by fire, shipwreck, or the like.

UNINTELLECTUAL, a. *ŭn-ĭn'tĕl-lĕk'tū-ăl:* not intellectual.

UNINTELLIGENT, a. *ŭn'ĭn-tĕl'lĭ-jĕnt:* lacking or deficient in intelligence or understanding. UN'INTEL'LIGENCE, n. *-lĭ-jĕns*, lack of intelligence; stupidity. UN'INTEL'LIGIBLE, a. *-lĭ-jĭ-bl*, that cannot be understood. UN'INTEL'LIGIBLY, ad. *-blĭ.*

UNINTENDED, a. *ŭn'ĭn-tĕnd'ĕd:* not intended.

UNINTENTIONAL, a. *ŭn'ĭn-tĕn'shŭn-ăl:* not intentional; done or happening without design. UN'INTEN'TIONALLY, ad. without design.

UNINTERESTED, a. *ŭn-ĭn'tẽr-ĕst-ĕd:* not having the mind engaged; having nothing at stake. UNIN'TERESTING, a. not capable of exciting or attracting the mind. UNIN'TERESTINGLY, ad. *-lĭ.*

UNINTERPOLATED, a. *ŭn'ĭn-tẽr'pō-lā-tĕd:* not interpolated.

UNINTERPRETED, a. *ŭn'ĭn-tẽr'prĕ-tĕd:* not interpreted or explained.

UNINTERRED, a. *ŭn'ĭn-tẽrd':* not buried.

UNINTERRUPTED, a. *ŭn'ĭn-tẽr-rŭp'tĕd:* not interrupted; not broken; unceasing; not disturbed by intrusion or by another occupation. UNIN'TERRUP'TEDLY, ad.

UNINTRENCHED, a. *ŭn'ĭn-trĕnsht':* not protected by a ditch and parapet.

UNINTRODUCED, a. *ŭn'ĭn-trō-dūst':* not introduced; not duly conducted or ushered into a place; not brought into notice.

UNINURED, a. *ŭn'ĭn-ūrd':* not hardened by use or practice.

UNINVENTED, a. *ŭn'ĭn-vĕnt'ĕd:* undiscovered. UN'INVEN'TIVE, a. *-tĭv,* destitute of invention.

UNINVESTED, a. *ŭn'ĭn-vĕst'ĕd:* not placed in possession, as of an office; not laid siege to; not laid out in some investment.

UNINVESTIGATED, a. *ŭn'ĭn-vĕs'tĭ-gā-tĕd:* not searched into.

UNINVITED, a. *ŭn'ĭn-vī'tĕd:* not invited; not requested; unbidden; not solicited. UN'INVI'TING, a. not enticing; not alluring; ungracious.

UNINVOKED, a. *ŭn'ĭn-vōkt:* not invoked.

UNIO, n. *ū'nĭ-ō* [L. *unĭō,* unity, the number one—from *ūnus,* one]: genus of bivalves containing the river-mussels; a member of this genus or of the family *Unionidæ.* UNIONIDÆ, n. plu. *ū'nĭ-ŏn'ĭ-dē,* the family of river-mussels found in ponds and streams (see FRESHWATER MUSSEL).

UNION, n. *ūn'yŭn* or *ū'nĭ-ŭn* [F. *union,* union—from mid. L. *unĭō* or *unĭōnem,* a union—from L. *ūnus,* one: It. *unione*]: the act of joining two or more things into one in order to form a new body; concord; agreement; intimate connection; that which is united or made into one; a combination, confederation, or league: in particular, (*a*) a permanent combination among workmen engaged in the same occupation or trade, instituted for mutual protection and assistance in matters of dispute between them and their employers (see TRADE-UNION); (*b*) in England and Ireland, several parishes united for the joint management of their poor; (*c*) the work-house maintained by such a combination of parishes; a fabric of different materials, as cotton and wool, or of silk or linen and wool: that part of a flag which occupies the upper corner next the staff and is distinguished from the rest by color or pattern. UN'IONISM, n. *-ĭzm,* the system of combination among workmen engaged in the same occupation or trade. UN'IONIST, n. *-ĭst,* one who advocates or promotes union; a member of a trade-union. UN'IONIS'TIC, a. *-ĭs'tĭk,* of or pertaining to unionism; tending toward union. UNION-CORD, a round white cord made of mixed cotton and linen threads. UNION-JOINT, a joint in the form of the letter T for uniting pipes of iron, etc. UNION BY THE FIRST INTEN-

TION, in *surg.*, the growing together of the opposite surfaces of a recent wound, when brought into contact, without suppuration. UNION DOWN, adverbial phrase, meaning 'with the union down,' denoting the position of a flag flying upside down as a signal of distress.—SYN. of 'union': junction; concord; coalition; unity; combination; alliance; connection.

UNION, Maine: town in Knox co.; on the Georges Valley Railroad, a short line which extends from Warren (q.v.) to Union. The town contains the villages of Union, South Union, North Union, and East Union. It was settled in 1744 and was first called Taylor Town. In 1786 it was organized as the Plantation of Sterlington, but the same year it was incorporated and took the name Union. In 1811 a part of the town was set off and called the town of Washington. The chief manufacturing establishments are mowing machine works, machine shops, carriage and furniture factories, and organ works. Stoves are made here and considerable attention given to farm and dairy products. Pop. (1900) 1,248; (1910) 1,233.

UNION, TOWN OF: Hudson co., N. J.; on the Hudson river, opposite New York, 1 m. n. of Hoboken.—Pop. (1900) 15,187; (1910) 21,023.

UNION CITY, Ind.: city, Randolph co.; on the Pitts burg, C., C. & St. L. and the Cleveland, C., C. & St. L. R.R.'s; about 80 m. n.e. of Indianapolis, and 32 m. e. of Muncie. It is near the Ohio boundary. Union City is in an agricultural and stock-raising region; and the forests contain valuable hard woods, as ash, oak, hickory, walnut, and chestnut. The chief manufacturing establishments are flour mills, creameries, furniture factories, and machine shops. There are a high school, public and parish schools, and a library. The two state banks have a combined capital of $175,000. Pop. 3,100.

UNION CITY, Mich.: village in Branch co.; on the Saint Joseph River, and on the Michigan Central Railroad; about 55 m. s.w. of Lansing and 28 m. s.e. of Kalamazoo. It is in a fertile agricultural region. The chief manufacturing establishments are a flour mill, creameries, a machine shop, and lumber mills. It ships a considerable amount of farm and dairy products, and fruit. The two national banks have a combined capital of $100,000. Pop. 1,700.

UNION CITY, Pa.: borough in Erie co.; on the Pennsylvania, the Western N. Y. & P., and the Erie R.R.'s; about 25 m. s.e. of Erie. It is in an agricultural and oil region. The chief industrial establishments are flour mills, barrel factories, wagon and carriage works, furniture factories, oil-refinery, a tannery, and a pump factory. Cabinet ware and dairy products are among the shipments to outside markets. The educational institutions are a high school, public and parish elementary

schools, a business college, and a library. There is one national bank, established in 1898, with a paid up capital of $50,000 and deposits amounting to $292,110. Pop. (1900) 3,104; (1910) 3,684.

UNION CITY, Tenn.: town, county-seat of Obion co.; on the Nashville, C. & St. L. and the Mobile & O. R.R.'s; about 6 m. from the Kentucky border and 110 m. n.e. of Memphis. It is in an agricultural and stock-raising region and nearby are extensive timber lands. The chief manufacturing establishments are lumber mills, ice factories, canneries, furniture works, cotton mills, spoke factories, and machine shops. The principal products shipped to other markets are farm and dairy products, fruit, cotton, and lumber products. In 1900 (government census) there were 35 manufacturing establishments, the value of whose average annual products was $558,470. The educational institutions are Union City High School and Training School, five public elementary schools, four for white and one for colored pupils, and a school library. The two banks have a combined capital of $100,000, and deposits $175,000. Pop. (1910) 4,389.

UNION COLLEGE, located at Schenectady, N. Y. See UNION UNIVERSITY.

UNION-JACK [from F. *jacque*, surcoat or jacket, charged with the red cross of St. George, worn by English soldiers in the middle ages (see JACK)]: national banner of the United Kingdom of Great Britain and Ireland; formed out of a combination or union of the crosses of St. George (argent, a cross gules), of St. Andrew (azure, a saltire argent), and of St. Patrick (argent, a saltire gules), representing England, Scotland, and Ireland respectively. The first union-jack, introduced by royal proclamation 1606, three years after the union of the Scottish with the English crown, combined the crosses of St. George and St. Andrew; and was by royal proclamation 1707, July 28, constituted the national flag of Great Britain (fig. 1). On the union of Ireland with Great Britain, a new union ensign was devised, in which the cross of St. Patrick was introduced, with its four limbs edged with white on one side: this awkward specimen of heraldry forms the present union ensign (fig. 2).

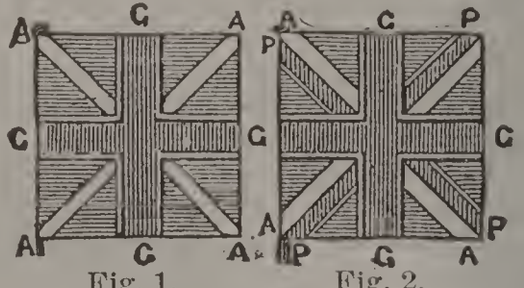


Fig. 1. Fig. 2.

G, St. George's Cross; A, St. Andrew's Cross; P, St. Patrick's Cross.

UNION, La, Philippines: a province of the island of Luzon, in the s.w. part of n. Luzon, bordering on the China Sea; bounded on the n. by Ilocos Sur, on the e. by Lepanto and Benguet, and on the s. by Pangasinán; length, n. and s., 51 m.; greatest width, 31 m. in the n., narrowing to 10 m. in the s.; area, 867 sq.m. The province is mountainous in the e., the w. mountain sides sloping abruptly to the coast plains. There are numerous small rivers. The soil is well cultivated; tobacco, rice, corn, cotton, sugar, and chocolate are the principal products; large quantities of sibucao, a valuable dye plant, grow on the mountains. Live-stock raising is one of the principal industries of the province; carabaos and cattle, horses, and hogs are raised. The w. coast road of Luzon traverses this province; this is paralleled by a telegraph line and also the proposed route for a continuation of the Manila & Dagupan Railroad; there are no roads, however, which extend any distance into the interior. Civil government was established in 1901, August; and at the close of that year the provincial governor reported the province in a peaceful and prosperous condition. Pop. (1901) 110,464.

UNION, La, Salvador: a seaport and capital of the department of the same, at the base of the Pinos volcano, rising from the w. short of Union Bay, a landlocked inlet of the Gulf of Fonseca. An active domestic and coasting trade is carried on. Pop. 4,000.

UNION LABEL, a method adopted in the United States by trade unions for the peaceful solution of the boycott question. The union label originated in 1896 with the cigarmakers of San Francisco in their conflict with Chinese labor. Since then its application has spread till all trades-unionism looks to it as one of the most successful means of waging the struggle with combined capital. By agreement with the manufacturers the labels, copyrighted by the unions, are attached to the various products of factory and mill, each box of cigars, for instance, each newspaper, each garment, and so on. A few unions, notably the famous 'Big Six' Typographical Union of New York, with nearly 6,000 members, have imposed a fine for purchasing any but labeled goods, provided they can be had.

UNION LEAGUE OF AMERICA, The: began in 1862 in order to check the spread of disaffection to the United States government and to 'make loyalty effective.' The movement was spontaneous; the members of the United States Sanitary Commission began the organization in 1862, in Ohio, Philadelphia, and New York. Leagues were formed all over the North before the end of 1863. The members were pledged to repudiate any political belief that conflicted with unconditional loyalty to the Union. Several similar orders were absorbed by the Union League. The organization distributed more

than 5,000,000 political pamphlets; recruited negro regiments; sent teachers to instruct the negroes; and demanded negro suffrage in 1865. The league was gradually extended into the South among the 'Unionists,' and during 1865-6 had a strong membership of whites in the mountain districts of that section. In 1867 negroes were admitted to the order in the South and at once nearly all of the whites deserted. From 1867 to 1876 the league and its offshoots formed the 'machine' of the Radical party in the South. It controlled the negro vote absolutely and organized it well; it made all nominations for office, and severely disciplined those who disobeyed orders. A constitution and ritual were adopted for use in the South. There was a weird initiation ceremony to impress the negroes. The members swore to vote for no one except members of their own order. An ex-Confederate could not join unless he would acknowledge that his course during the war had been treason, and under no circumstances was he eligible to office in the order or to become a candidate for political office. The administration of the league was in the hands of the so-called carpet-baggers or political adventurers from the North. The local assemblies were called Councils; these together formed the Union League of America, with headquarters in each Southern State and general headquarters in New York. In the councils the negroes were drilled in the faith of the Republican party, a catechism being prepared for that purpose. There was complaint that the league was a cause of disorder and violence among the blacks on account of its incendiary teachings. At one time it was said that the membership reached 500,000 in the South. In the North after 1865 the order gradually died out, the surviving leagues becoming social clubs. As an institution of Reconstruction the Union League was most important. The rigid organization and the strict control imposed by it upon the blacks, made it possible for them to vote as a race and vote the Republican ticket. Without the admirable discipline of the order, the few leaders of the Radical party in the South would have been unable to prevent the Conservative or Democratic party from controlling the votes of the negroes, thus preventing the objects of the Reconstruction.

UNION LEAGUE CLUB, THE: a social and political club organized in 1860, in New York, by members of the local Republican party. It was incorporated in 1865, its avowed object being 'to promote, encourage, and sustain by all proper means, absolute and unqualified loyalty to the government of the United States; to discountenance and rebuke, by moral and social influences, all disloyalty to said government and every attempt against the integrity of the nation'; and also to establish a library and art gallery for the collection of literature and works

of art, and military trophies relating to the war. The club has a membership of 1,800.

UNION, LEGISLATIVE: in British history, the incorporation of the kingdoms of Scotland by the Act of Union in 1707, and the union of the kingdom of Ireland with that of Great Britain in 1801. In the case of the union of Scotland with England to form the United Kingdom of Great Britain, it was provided in the Act of Union that there should be one parliament, in which the Scotch peers would be represented by 16 of their number to be elected for each parliament, and that 45 Scotch members should sit in the House of Commons. The Episcopal Church was to be the State Church for England, the Presbyterian for Scotland. Ireland was till 1801 a kingdom distinct from that of England and Great Britain, but in that year was united with Great Britain to constitute the United Kingdom of Great Britain and Ireland. Ireland's representation in the parliament of the United Kingdom was to be four lords spiritual (bishops) and 28 lords temporal in the House of Peers, and 120 members of the House of Commons. The Episcopal Church in Ireland and the Episcopal Church of England were united in one Protestant Episcopal Church.

UNION OF AMERICAN HEBREW CONGREGATIONS: An organization composed of 130 Jewish congregations in the United States, chiefly reformed, which was formed in 1873, through the efforts of Rev. Dr. I. M. Wise, of Cincinnati. Its aims are to establish institutions for higher instruction in Hebrew literature and theology, with preparatory schools; to provide means to relieve Jews from political oppression and to furnish educational aid; to promote religious instruction and encourage Scripture study. It has established the Hebrew Union College of Cincinnati, which has graduated 100 rabbis; measures for synagogue and school extension, and a committee on civil rights. It meets bi-ennially and is governed by an executive board.

UNION SPRINGS, Ala.: town, county-seat of Bullock co.; on the Central Railroad of Georgia; about 40 m. s.e. of Montgomery and 175 m. n.e. of Mobile. It is in an agricultural and fruit region. The chief manufacturing establishments are cotton gins, cotton-seed-oil mills, cotton mills, spoke and handle factories, grist mills, and a machine shop. The educational institutions are a high school, founded in 1899, public graded schools, and several private schools. The two banks have a combined capital of $122,000, and deposits $310,000. Pop. about 3,000.

UNION THEOLOGICAL SEMINARY: institution in New York for educating candidates for the ministry of the Presb. Church. It was opened 1836, chartered 1839. Till 1884 the seminary occupied a building in University

Place; then it removed to the imposing group of structures on Park avenue specially erected for it. The Seminary is governed by a board of trustees, members of the Presbyterian Church, one-half of whom are ministers, the other half laymen. The professors (who all are ministers of the Presbyterian Church, are required to subscribe to the Westminster confession of faith and to declare their acceptance *ex animo* of the ecclesiastical polity of Presbyterianism. Subscription to the Presbyterian standards is not required of students: the institution is open to students of every Christian evangelical denomination. The conditions of admission are: proved good standing in an evangelical church, and evidence that the candidate has received a regular collegiate education but a candidate may demonstrate on examination by the faculty his competent acquaintance with the subject-matters of a college course, and may be admitted though he have never studied in college. The grounds and buildings are valued at more than $500,000; productive funds $1,400,000. Instruction is gratuitous. The annual rental of a room in the seminary building with light and heat is $35. There are in the library 77,275 vols., 50,000 pamphlets, and about 200 MSS. The nucleus of the library was about 13,000 vols., forming the private library of Leander Van Ess, in which are contained 430 vols. printed between 1469 and 1510, 1,246 pieces of Reformation literature in original editions, 4,209 works of ecclesiastical history, writings of the Fathers, etc., and 200 editions of the Bible in Latin and in German.—This seminary, though affirming the regular doctrinal standards of the Presbyterian Church, is regarded as giving them a liberal interpretation.—Upon the controversy that arose about Dr. Briggs in 1892, the seminary rescinded the concession formerly made to the general assembly of a veto on the appointment of its professors, and the general assembly thereupon removed the seminary from the list of institutions under its approval, and instructed boards of education not to grant aid to candidates for the ministry attending institutions not approved by the general assembly. The seminary therefore, while virtually Presbyterian, stands officially as an undenominational or independent institution.

UNIONTOWN, *ūn'yŭn-town:* borough in Fayette co., Penn.; on the Pennsylvania and the Baltimore & Ohio railroads; 72 m. s.-by-e. of Pittsburgh. It is in an agricultural, limestone, coke, coal, and iron-ore region, and was formerly known as Beesontown, from Jacob Beeson, who laid it out 1783. There are daily and weekly newspapers, manufactories of flour, cement, brick, foundry products, sashes and blinds, and tanned leather; and large shipments of grain and live-stock.—Pop. (1900) 7,344; (1910) 13,344.

UNION UNIVERSITY: Union College, unlike the

other older colleges in America, came into existence in response to a popular demand, which was essentially a citizens' movement, and expressed the growing national feeling. For this reason it did not take the name of any individual, and was from the beginning independent of denominational control. The first petition, signed by 850 citizens of Albany, Tryon, and Charlotte counties, was presented to the legislature of New York in 1779, or while the Revolutionary war was still in progress. It was not, however, until 1795, and after repeated appeals to the legislature, that a college charter was granted, although in 1785 an academy was organized which became the practical foundation of the college. The first president was the Rev. John Blair Smith, a graduate of Princeton. He was succeeded after four years by the Rev. Jonathan Edwards, the Younger, who died in 1801. The next president was the Rev. Jonathan Maxcy, a graduate of Brown and a Baptist, who resigned because of ill-health in 1804, when the Rev. Eliphalet Nott, also an alumnus of Brown, but a Presbyterian, was elected to the presidency. With his election the college began a new and aggressive life. Dr. Nott was a man of commanding presence and inspiring personality, fertile in ideas, and tireless in energy. Under his vigorous administration the college grew rapidly in numbers and in reputation, until it became one of the most prominent institutions in the country. Dr. Nott may be called the pioneer in modern educational progress. He was the first to break away from Old World traditions, and introduce new courses of study. As early as 1809 he instituted a course in modern languages, and in 1835 he established a scientific course running parallel for three years with the classical course. In 1845 he added a course in civil engineering, anticipating the demand for technical training which almost every other institution has since recognized. In still other ways Union College early gained distinction. It gave larger liberty to student life, and for necessary discipline depended more upon moral suasion than upon the enforcement of arbitrary penalties. It originated the college fraternity system, the oldest of these Greek letter societies, Kappa Alpha, Sigma Phi and Delta Phi, having been founded at Union in 1825, 1827, and 1828, respectively. These were followed by Psi Upsilon in 1833, Chi Psi in 1841, and Theta Delta Chi in 1847. Dr. Nott's presidency covered a period of 62 years, from 1904 to 1866, when he died at the advanced age of 93 years. He was succeeded by the Rev. Laurens P. Hickok, who had served as vice-president during the latter part of Dr. Nott's life. In 1868 Dr. Hickok resigned, and in 1869 the Rev. Charles A. Aiken was elected to succeed him. Dr. Aiken held the office for two years, and was followed by the Rev. Eliphalet Nott Potter, a grandson of Dr. Nott. Under Dr. Potter the college was greatly strengthened, and regained much of

its earlier prestige. He resigned in 1884, when for four years the college was without an official head, the Hon. Judson S. Landon acting as provisional president. In 1888 Harrison E. Webster became president, but because of ill-health resigned in 1894, and was succeeded by the present president, the Rev. Andrew V. V. Raymond.

Union is noted for the large number of its graduates who have become prominent in political life and as men of affairs. Before 1860, it was the most distinctively national of all our educational institutions, drawing its students from every part of the country, especially from the south. Because of this it suffered more than did any other northern college during the civil war. It has always been thoroughly democratic in spirit, and has aimed to give its students a practical education. In recent years, while not abandoning its historic position as a classical and literary institution, it has taken advantage of the exceptional opportunities offered by its location in the city of Schenectady, the recognized centre of scientific interests, and has developed, with the coöperation of the General Electric Company, strong civil, sanitary and electrical engineering courses. With its inspiring traditions, its present sound financial condition, and its increasing patronage, this old college has much to expect of the future.

In 1873 Union University was organized by legislative act, and included the academic and engineering departments in Schenectady, and the law school, medical college, and Dudley Observatory in Albany. To these several departments was afterward added a school of pharmacy, founded in Albany in 1881. The academic department offers three courses, leading to the degrees of A.B., B.PH., and B.S.; the work of the last two years is largely elective; in addition the work of the engineering department leads to the degree of bachelor of engineering. The course at the medical school is four years, and the courses at the law school and school of pharmacy two years each. The observatory possesses a large equatorial telescope, a meridian circle, and full scientific equipment.

UNIONVILLE: town, county-seat of Putnam co., Mo.; on the Chicago, Burlington and Kansas City railroad; about 140 m., in direct line, n. by w. of Jefferson City. It is in an agricultural and stock-raising region and in the vicinity are large coal mines. The industries are chiefly connected with farm products and mining. The educational institutions are the public graded schools, one private school, and a school library. The three banks have a combined capital of $115,000, and deposits amounting to $406,980. Pop. (est.) 2,200.

UNIPAROUS. a. *ū-nĭp'ă-rŭs* [L. *unus*, one; *pario*, I bear or bring forth]: producing only one at a birth; in *bot.*, having a cymose inflorescence in which the pri-

mary axis produces one bract, and so on, the cyme being elongated according to its development; having a scorpiodal cyme.

UNIPED, a. *ū'nĭ-pĕd* [L. *ūnus,* one; *pes* or *pĕdem,* a foot]: having only one foot.

UNIPETALOUS, a. *ū'nĭ-pĕt'ă-lŭs* [L. *ūnus,* one, Gr. *pĕtălon,* a leaf]: having a corolla consisting of one petal, which depends upon the abortion or non-development of others—to be distinguished from Monopetalous (q.v.).

UNIPOLAR, a. *ū-nĭp'ŏ-lẽr* [L. *ūnus,* one; *pŏlus,* a pole]: in *anat.,* having a single pole, as certain ganglionic nerve-cells; having but one radiating process.

UNIQUE, a. *ū-nēk'* [F. *unique,* sole, singular—from L. *unĭcus,* only, sole—from *ūnus,* one]: sole; only; without an equal; without another of the same kind: N. anything unparalleled or without an equal. UNIQUE'LY, ad. *-lĭ.* UNIQUE'NESS, n. *-nĕs,* the state of being unique.

UNIRADIATED, a. *ū'nĭ-rā'dĭ-ā-tĕd* [L. *ūnus,* one; *radĭus,* a ray]: having one ray.

UNIRRITATED, a. *ŭn-ĭr'rĭ-tā-tĕd:* not provoked or angered.

UNISEPTATE, a. *ū'nĭ-sĕp'tāt* [L. *ūnus,* one; *septum,* a hedge]: in *bot.,* having but one septum.

UNISERIATE, a. *ū'nĭ-sē'rĭ-āt,* or UNISE'RIAL, a. *-rĭ-ăl* [L. *ūnus,* one; *sĕrĭēs,* a row, a series]: in *bot.,* arranged in a single line or row. UN'ISER'IATELY, ad.

UNISEXUAL, a. *ū'nĭ-sĕks'ū-ăl* [L. *ūnus,* one, and Eng. *sexual*]: of a single sex—applied to plants having separate male and female flowers.

UNISON, n. *ū'nĭ-sŭn* [L. *ūnus,* one; *sŏnus,* a sound]: sameness of sound; sounds precisely equal in respect to acuteness or gravity; two or more sounds of the same name produced at the same time; agreement; concord: ADJ. sounding alone. UNISONANT, a. *ū-nĭs'ō-nănt* [L. *sonans* or *sonan'tem,* sounding]: having the same degree of gravity or acuteness. UNIS'ONANCE, n. *-năns,* accordance of sounds. UNIS'ONOUS, a. *-nŭs,* sounding in harmony.

UNIT, n. *ū'nĭt* [L. *unĭtas,* oneness, sameness—from *ūnus,* one: F. *unité;* It. *unità*]: one; a single person or thing; the least whole number; a certain dimension or magnitude assumed as a standard of measure—thus, in English-speaking countries the inch is the *unit* of length.

UNITARIAN, n. *ū'nĭ-tā'rĭ-ăn* [L. *unĭtas,* oneness—from *ūnus,* one]: one who denies the doctrine of the Trinity, ascribing true and proper divinity to God the Father only: ADJ. pertaining to. U'NITA'RIANISM, n. *-ĭzm,* the doctrines of those who deny the deity of Christ as being inconsistent with the unity of God, and who deny the personality of the Holy Spirit.

UNITARIANISM.

UNITARIANISM: theologically speaking, all Unitarians insist on the essential unity of God as opposed to the Trinitarian conception—a triune division of the godhead into the Father, Son and Holy Ghost. In this sense Jews, Mohammedans, and all Theists, as well as the Christians bearing the name, are Unitarians. The earlier Christian Unitarians were wont to rest their claim on the synoptic representation of the man Jesus as essentially human in his nature, a prophet and reformer, the 'Son of God' indeed, but also the 'son of man.' They claim that, yielding to the neo-platonic philosophy of the times, Paul and the writers of the Johannine portions of the New Testament, which came later in point of time than the Synoptics, began to elevate the son of a Nazarene carpenter to supernatural levels. In their hands the 'Christ' became an exalted mediator. The Messianic expectation of the Jews, joining with the Platonic conception of the logos as an emanation of Divinity, clothed the 'Christ' with divine powers. This process of deification continued until by the 4th century he became a mystical part of the godhead.

The early theological dispute concerning the nature of the 'Christ' culminated in the great Council held at Nicea 325 A.D. (q.v.). From that time to the present, Unitarianism has been in the minority, and consequently deemed *unorthodox.* At the present time, in its organized form, it represents one of the so-called *heterodox* sects. Its story is one of ostracism, martyrdom, persecution and distrust. Its history must largely be found in the biographies of its leaders, its martyrs and its thinkers. Arius contended with Athanasius at Nicea in the 4th century and was defeated by popular vote. Michael Servetus, a Spanish physician of the 16th century, contended with John Calvin, who caused his arraignment, consented to his being burned (1553) 'over a slow fire' for 'denying the equality of God the Son with God the Father.' The execution took place in Geneva, Switzerland, two hours after the sentence was pronounced. His last cry was, 'Jesus, Son of the eternal God, have mercy on me!' Farel, the Premier, retorted, 'Call rather on the eternal Son of God!' which he refused to do. This slight turn in phrase indicates the essential point at issue. Lelius Socinus, a cultivated Italian gentleman of noble birth, a graduate of the law school of Bologna, was 28 years of age when Servetus was burned. He took up the Servetus contention and this necessitated his removal from Sienna. He studied for a while with Melanchthon, had some intercourse with Calvin, and died a disinherited exile in the 37th year of his age. His nephew, Faustus, 14 years his junior, inherited his uncle's notes and task. He was compelled to take refuge in Poland, perhaps the only place in Europe at that time which would tolerate such heresy. Here he lived for 25 years and founded the movement known as 'The Polish

Brotherhood,' essentially an Unitarian movement, which spread rapidly. At Racow they established a college of a thousand students. Here was published the 'Racovian Catechism,' the first Unitarian catechism formulated. On Ascension Day, 1598, in the university town of Cracow, this man was dragged half-naked from a sick bed by a student mob, his books, papers and manuscripts plundered and burned in the market place. With drawn sword over his head, and the threatening fire before his eyes, he was called upon to retract. His reply was, 'I retract nothing. What I was I am, and by the grace of the Lord Jesus, that I shall be until my last breath. Do you what God permits!' Bereft of fortune, hunted and hated, he died in seclusion in the 65th year of his age. 'The Polish Brotherhood' movement throve for about a hundred years; their numbers were counted by the tens of thousands. But a reaction came; the college at Racow was closed, printing houses demolished, ministers and professors banished. In 1658 a sweeping order came ordaining that

'All those in the realm who deny the fore-eternity of the Son of God, or who shall protect and cherish its upholders, and shall be lawfully convicted of the same, shall be liable to be, without delay, capitally punished by our magistrates, by their own authority, under penalty of loss of office.'

A respite of three years was granted for the sale of estates and collection of debts but this was cut short at the end of two years, and in 1660 the beggared and stripped Unitarians of Poland, many thousands in number, sought shelter in Holland, Prussia and Transylvania. In the latter country alone did the 'Socinii,' as they were called, find hospitable reception.

An Hungarian prince married Isabella, daughter of Sigismund the Great. Queen Isabella secured Blandrata, an Italian exile and friend of Faustus Socinus, for tutor to the young Prince John. He grew up to be the first Unitarian king that ever sat upon a throne. Late in life, from the obscurity of a shoemaker's bench in a remote countryside, Francis David emerged to study under Melanchthon, acquaint himself with the literature of Servetus and the Socinii, and to become the bishop of the Unitarians of Transylvania, the chaplain extraordinary of the Queen. In open debate he discussed the Trinity at the royal court and was pronounced victor. A great stone boulder on the campus of the University of Buda-Pesth is an Unitarian relic, for from the top of this boulder Bishop David recounted the story of his triumph and re-stated his faith. But the logic of the situation, as Bishop David understood it, carried him into trouble. He could not 'pray in the name of the Christ,' God alone being adorable. This led to a heresy trial. The 'Non-Adorantes' were defeated by the 'Adorantes,' and the brilliant shoemaker, scholar and bishop was sentenced to prison, where he died.

Two years before the burning of Servetus, G. von

Paris, a surgeon from Maintz, was burned at Smithfield, London, for Arian views (1551). Four years later (1555) Patrick Packingham was burned at Uxbridge, England, for the same crime. The next year (1556) John Philpot, Arch-deacon of Winchester, was tried for 'spyttinge on an Arian,' in justification of which he said, 'I spat to relieve that sorrow which I conceived for that blasphemy.' Twenty-three years later (1579) Matthew Hamont, a wheelwright who named his son Erasmus, was burned at Norwich; John Lewis (1583), Peter Cole, a tanner (1587), Francis Kent (1589), a Fellow of Corpus Christi at Cambridge, were all burned at Norwich, the crime of Kent being that he 'held Christ to be a good man.' In 1612, 59 years after the burning of Servetus, Bartholomew Legate was burned at Smithfield and his brother Thomas died in prison because they 'held Christ to be a mere man, but born free from sin.' A month or two later Edward Wightman was burned at Litchfield; two years after, the Racovian Catechism was burned at St. Peter's Square, London. In 1640 all printers, importers and readers of Socinian books were proscribed by the Convention of Canterbury. In 1648 denial of the Trinity was made a capital crime, and not until a hundred years after the burning of Servetus, under the strong hand of Cromwell, was the grip of persecution somewhat released and the anathema against Unitarian heresy somewhat ameliorated in England.

Joseph Priestley (1733-1804), an eminent scholar and scientist, preached the Unitarian heresy in Birmingham, for which his church was burned, his library destroyed and he was compelled to take refuge in America where he established the first avowedly Unitarian Society at Northumberland, Pa. (1794). Two years later he started the Unitarian movement in Philadelphia. But about this time the New England states proved a fertile field for the Unitarian heresy.

The historical landmarks in the development of Unitarianism in America may be mentioned as follows:

1784, revision of the Kings Chapel liturgy in Boston to favor Unitarian views, under the ministry of Doctor Freeman.

1817, the establishment of the Divinity School of Harvard University, the conditions of the endowment being that 'Every encouragement be given to the serious, impartial and unbiased investigation of Christian truth.' The constitution provided that 'No assent to the peculiarities of any denomination of Christians shall be required, either of the instructors or students.'

1819, the preaching by William Ellery Channing of the sermon on 'Unitarian Christianity' at the installation of Rev. Jared Sparks at Baltimore.

1825, the organization of the American Unitarian Association in Boston.

1837, the delivery of Emerson's 'Divinity School Ad-

dress' to the graduating class of the Cambridge Divinity School.

1841, the preaching by Theodore Parker of the sermon on 'The Permanent and the Transient' at the ordination of Rev. C. C. Shackford in Boston.

1844, the opening of the Meadville Theological School at Meadville, Pa., which provided that 'No doctrinal test shall ever be made a condition of enjoying any of the opportunities or instruction in this school.'

1865, organization of the Free Religious Association in Boston.

1885, the delivery of the sermon on 'The Faith of Ethics' by William C. Gannett before the Illinois State Unitarian Conference. This helped to raise the 'Issue in the West,' which led to the passage a year later of the resolution placing the Western Unitarian Conference on a purely 'ethical basis,' conditioning its 'fellowship on no dogmatic test but welcoming thereto all those who desire to promote truth, righteousness and love in the world.'

1893, the Parliament of Religions held in Chicago in connection with the World's Columbian Exposition.

1894, the organization of the Congress of Religion in Chicago.

1900, organization of the New York State Conference of Religion. The same year the organization of the International Council of Unitarian and other Liberal Religious Thinkers and Workers.

1909, organization of the National Federation of Religious Liberals.

A careful study of this historical outline supplemented by a reading of the four great discourses, epoch-marking in the development of American Unitarianism, by Emerson, Channing, Parker and Gannett, each of which marks convulsive agitations within the body, will reveal the fact that the Unitarian thought concerning the personality of Jesus is the logical outcome of two principles more fundamental than any theological doctrine, viz:

(1) The right of private judgment; the sanctity of reason in matters of religion as elsewhere, and

(2) The attendant confidence in the essential integrity of human nature, and consequently the universality of religious fundamentals, the *Sympathy of Religions* (see T. W. Higginson's famous tract of this title).

The denial of the deity of Jesus carries with it the emphasis of the divinity of man. Pelagius, who, in the early part of the 5th century denied the doctrine of the 'Fall,' the 'Total Depravity,' and emphasized the essential dignity of human nature, was as fundamentally a Unitarian 'Father' as was Arius. The brotherhood of man is a necessary corollary of the fatherhood of God. Consequently the story of Unitarianism is something much larger than that of the Unitarian denomination. Its present triumph and power are best indicated by the acceptance of the so-called 'higher criticism' in the study

of the Bible, the transference from theological to sociological emphasis in religion, the disposition everywhere among thoughtful men to come together, to unite on the things held in common.

At the present time the English Unitarians have their headquarters at Essex Hall, London, where missionary and publication activities are carried on. They represent from 350 to 400 societies in the realm.

The American Unitarian headquarters is at 25 Beacon Street, Boston, with branch offices in New York, Chicago, San Francisco and elsewhere. Their Year Book for 1908 represents 483 churches and 558 ministers. About 1734 Rev. Jenkin Jones, of South Wales, headed a heretical movement which resulted in a group of some 70 Unitarian churches with a monthly organ and a divinity school now found in Wales. The services and publications are in the vernacular.

The movement organized by Bishop David in Transylvania is still active; there are now about 300 societies, with monthly organ, divinity school, etc.

The Unitarians enumerate in their fellowship conspicuous leaders in the world of letters, reform, science, and philanthropy, out of all proportion to the statistics of the denomination.

The way of salvation, the test of religious excellence, according to the contention of modern Unitarians, is the way of reason, of love and duty, hence 'Freedom, Fellowship and Character in Religion' has become a favorite interpretation of the movement, in the mouths of many.

To those who would know more of the teachings of Unitarianism the study of the following leaders and authors is commended:

Roger Williams, Thomas Jefferson, William Ellery Channing, Theodore Parker, Ralph Waldo Emerson, James Martineau, James Freeman Clarke, Henry W. Bellows, Thomas Starr King, Robert Collyer, and the progressive interpreters of the Bible and leaders in the movement who undertake to interpret religion in terms of religious fellowship and helpfulness.

UNI'TAS FRA'TRUM. See MORAVIAN BRETHREN.

UNITE, v. *ū-nīt* [L. *unītus*, pp. of *unĭō*, I join together—from *ūnus*, one: It. *unire:* F. *unir*]: to join two or more into one; to combine; to join in affection or interest; to cause to agree; to make to adhere; to coalesce; to be cemented; to couple; to grow together; to be mixed; to concur; to act in concert; to grow up into one. UNI'TING, imp. UNI'TED, pp.: ADJ. joined; made to agree; mixed. UNI'TEDLY, ad. *-lĭ*. UNI'TABLE, a. *-tă-bl*, that may be united. UNI'TER, n. *-tėr*, one who or that which unites. UNITIVE, a. *ū'nĭ-tĭv*, tending toward union. UNITY, n. *ū'nĭ-tĭ* [L. *unĭtas* or *unĭtātem*, oneness]: state of being one; concord; agreement; oneness of sentiment or behavior. UNITIES, n. plu. *ū'nĭ-tĭz*,

the correspondence of various parts so as to form one harmonious whole; the principles of dramatic writing, in which the correspondence of time, place, and action is preserved. UNITED BRETHREN, the Moravians (q.v.). UNITED PRESBYTERIANS, in *Scot.*, the church formed in 1847 by the amalgamation of the Secession and Relief churches.—SYN. of 'unite': to coalesce; connect; add; join; amalgamate; attach; cohere;—of 'unity': union; oneness; junction; harmony.

UNITED ARMENIANS: a branch of the Catholic church in communion with the See of Rome, but retaining the liturgy and ritual of the ancient Armenian church: they are estimated to number 100,000 souls. In 1830 Pius VIII. nominated a primate for the United Armenians of European Turkey; and as accessions from the Schismatical Armenian church grew numerous, six suffragan episcopal sees were created 1850. In resentment of the Pope's intervention in the election of their patriarch in 1870 a schism arose, and the United Armenian church lost upward of 4,000 members; the seceders were excommunicated by the Pope, but they elected a patriarch of their own and came into possession of most of the church property. The schismatical patriarch in 1879 renewed his obedience to Rome, and his example was followed by many of the clergy and people. The United Armenians live in European and Asiatic Turkey, and in Russia and Austria.

UNITED AMERICAN MECHANICS, JUNIOR ORDER OF: a fraternal and beneficial organization founded in 1853. In 1908 it had a membership of 184,741, with 32 state councils, and 1,918 subordinate councils. In the same year the order paid benefits to the amount of $664,915.

UNITED AMERICAN MECHANICS, ORDER OF: a fraternal and beneficial organization founded in 1845. In 1908 it had a total membership of 36,534, with 14 state councils and 559 subordinate councils.

UNITED BAPTISTS: a religious sect in the United States which had its rise in the middle of the 18th century during the great revival of religion under the ministrations of George Whitefield. Owing to differences of opinion among Baptists as to the methods of the revivalists some of them seceded from the churches and were called Separates, while those who remained were distinguished as Regulars: the Separates approved the 'new measures,' the Regulars condemned them. After a time some members of both factions came together and took the name of United Baptists. Their articles of belief declare that Christ died to make atonement for sin; that sinners freely choose their condition; that baptism should be administered to believers only, and by immersion; and that foot-washing ought to be practiced by all baptized believers. The sect exists chiefly in the

southwestern states. In 1908 it had in the United States 25 ministers, 204 churches, 13,209 communicants.

UNI'TED BRETH'REN, or Bohemian Brethren. See Moravian Brethren.

UNITED BRETH'REN IN CHRIST: denomination of evangelical Christians founded through the labors of the Rev. Philip William Otterbein (q.v.). Though not formally organized till 1800, its origin is traceable to the revival movement begun by the meeting of Mr. Otterbein with the Rev. Martin Boehm, a minister of the Mennonites, about 1766. Following this date, 'great meetings' were held, and revivals were promoted, especially among the Germans. As the work enlarged, preachers were licensed by these leaders, and conferences were held 1789 and 91; but the movement did not take the form of a church till 1800, when a conference was held at Peter Kemp's in Frederick co., Md., at which the name of the denomination was definitely fixed, and Otterbein and Boehm were chosen bishops. Thereafter conferences were held annually. At the first general conference, 1815, June, at Mt. Pleasant, Penn., the Confession of Faith was revised and formally adopted. The church was not the result of a schism, nor an offshoot from any denomination, but the result of a natural growth in adoption of such organization and methods as were found requisite in its providential mission. The United Brethren have sometimes been confounded with the Moravians, *Unitas Fratrum*, with whom they never had any historical connection. They have been classed sometimes as Methodists, for which there is no authority whatever: Otterbein and Boehm both were preaching the doctrines of a change of heart and the witness of the Spirit before there were any Methodists in America. The government of the church is composite, combining elements of simplicity and flexibility. A formal constitution for the church was adopted by the general conference 1841. The highest legislative and judicial authority is vested in a general conference which meets quadrennially, composed of elders and laymen elected by the entire membership of the church. Other official bodies in the church are annual and quarterly conferences, and on stations the official board. Lay representation in the annual conferences was authorized 1877, and was made a definite rule 1889. The superintendents of the church are called bishops, and are elected every four years by the general conference. In the annual conferences superintendents are known as presiding elders, and are chosen for a period of one year. The constitution provides for the 'itinerant plan' of ministerial service. Ministers are appointed to their charges one year at a time by a stationing committee composed, since 1889, of the bishop and presiding elders of an annual conference. The time-limit of the pastoral term is fixed at three years, with

the provision that it may be indefinitely extended by consent of the annual conference. Since 1889, women have been admitted to the ministry on the same terms as men. The general conference of 1885 provided for a commission of 27 members, lay and clerical, to submit to the membership amendments to the constitution and a revised Confession of Faith. The results were approved by a very large vote at a general election throughout the church 1888, Nov. At the following general conference, 1889, May, in York, Penn., the amended constitution and the revised Confession of Faith were declared to be the organic law and articles of faith. A schism resulted from this progressive action, 15 members withdrawing from the general conference, who formed a separate organization, with a small and scattered following.

The church is Arminian in theology, is characterized by liberty and simplicity in worship, congregational singing, and participation of all members, male and female, in the devotional services. It is aggressive and evangelistic in spirit; and on moral questions has ever taken advanced ground, especially on slavery and intemperance. The observance of baptism and the Lord's Supper is required; but the mode of baptism and the manner of observing the Lord's Supper are left to individual judgment. A personal religious experience is a condition of membership.

Originating in Maryland, Pennsylvania, and Virginia, the church extended westward, first to Ohio and Indiana, then to Canada and the western states and territories to the Pacific coast. Though its first work was principally among the Germans, at present less than 2 per cent. are attending services conducted in the German language. A publishing-house was established at Circleville, O., 1834; removed to Dayton, O., 1853. The *Religious Telescope,* the leading organ of the church, was founded 1834; *Our Bible Teacher,* magazine for Sunday-school teachers, 1873; the *Quarterly Review,* 1889. The net assets of the publishing house are $280,268.03, with annual business of more than $160,000, that yields large profits, which are devoted to the support of old and dependent ministers, and of the widows and orphans of ministers deceased. In 1853 a Missionary Society was organized, having home missions, and missions in Germany, w. Africa, and Japan. In 1875 the Women's Missionary Assoc. was organized, and now has successful missions in Germany, Africa, and China, and among the Chinese at Portland, Ore. The church has a theol. seminary at Dayton, O.; 9 colleges—the first being established 1847; 6 academies; with buildings and ground worth $400,000, and endowments aggregating $395,000. The following are statistics for 1908: Churches, 3,819; ministers, 1,864; members, 271,335.

UNITED COLONIES OF NEW ENGLAND (1643).

UNITED CHRISTIANS OF ST. THOMAS.

See CONFEDERATION OF THE THIRTEEN AMERICAN COLONIES.

UNITED CHRISTIANS OF SAINT THOMAS: those of the native Christians of Malabar and Travancor who are in communion with the Roman See. The Christian Church of Malabar, called the Church of the Christians of Saint Thomas, dates from an early period, perhaps the 6th century, and appears to have from the beginning been in communion with the patriarch of the Nestorians. At the close of the 16th century, under Portuguese domination, this church was brought into communion with Rome. When the Dutch succeeded the Portuguese, the Christians of Saint Thomas renounced the union with Rome, and receiving a metropolitan from the Jacobite patriarch of Jerusalem, adopted the creed and liturgy of the Monophysites; the direct opposite of their original Nestorianism. Throughout these changes a minority of the Christians of Saint Thomas adhered to Rome, and these, with later secessions from the schismatical Jacobite church, number about 100,000, subject to a vicar-apostolic appointed by the pope. They use the Syriac liturgy of the Nestorians, not that of the Jacobites.

UNITED COPTS: the small body of seceders from the Monophysite Coptic Church who acknowledge the supremacy of the pope and are in communion with the See of Rome. The church of the United Copts uses the rite of the Monophysite Coptic Church and retains many of the peculiarities of that church in matters of discipline. The United Copts are presided over by a vicar-apostolic appointed by the Sovereign Pontiff.

UNITED DAUGHTERS OF THE CONFEDERACY: a social, literary, historical, monumental and benevolent association, composed of the widows, wives, mothers, sisters and lineal descendants of men who rendered honorable service in the army and navy of the Confederate States, or who served in the civil service of the Confederacy, or of any of the States embraced therein, or who gave personal service to the Confederate cause. It was organized at Nashville, Tenn., 1894, Sept. 10, Mrs. Mr. C. Goodlett, of that city, being the prime mover. In recognition of this service Mrs. Goodlett was subsequently made a permanent official of the organization, with the title of honorary president and founder. The organization has 900 chapters, located in all parts of the United States, and has a total membership of over 40,000.

UNITED EVANGELICAL CHURCH: the official designation of the national church of the kingdom of Prussia. The division of the Protestants of Prussia and all Germany was ever a subject of regret to statesmen and churchmen, and many were the efforts made to effect a union of Lutherans and Calvinists. What amicable

conferences had failed to effect, that was at last brought about by autocratic decree in Nassau and Prussia in 1817, in Hesse in 1823, in Anhalt-Dessau in 1827. Neither Lutheran nor Reformed (Calvinist) was required to give up or to make any change in his creed; the two confessions were simply brought under one control—that of a superior church council, the Oberkirchenrath. The monarch, William III. of Prussia, prescribed to the United Evangelical Church a liturgical service that is neither Lutheran nor Calvinistic. In 1908 there were in the United States 553 ministers of the United Evangelical Church, with 1,014 churches and 70,116 communicants.

UNITED FREE CHURCH METHODISTS: a religious body in Great Britain formed by the amalgamation of two subdivisions of Wesleyanism, namely: The Wesleyan Association which had its rise in 1834 when, upon the removal of one or two influential ministers from the original connection, there resulted a secession; and the Wesleyan Reform Association, another body of seceders from the parent body, in 1849; this secession was caused by the expulsioin of several ministers from the Wesleyan Church on charge of insubordination. Soon these two seceding bodies entered into a union as United Free Church Methodists: 40 years after the union of the two bodies the United Methodist Free Church had over 85,000 members, 409 ministers and nearly 3,500 local preachers.

UNITED FREE CHURCH OF SCOTLAND: the name assumed by the ecclesiastical body formed 1900, Oct. 31, by the union of the Free Church of Scotland with the United Presbyterian Church of the same country.

UNITED GREEKS. See GREEK CHURCH.

UNITED IRISHMEN: a society for political reform founded in Belfast 1794: its aim was to promote union among all the people of Ireland without distinction of creed, for the preservation of their liberties and the extension of their commerce. At that time two-thirds of the people of Ireland, the Catholics, were by law excluded from all participation in the government of their country. The first society of United Irishmen consisted wholly of citizens of Belfast, respectable merchants and professional men, all of them Protestants or Presbyterians. The same year a branch society was formed in Dublin, and soon the Dublin society was recognized as the central directing body. In its membership were comprised many young men representative of the best elements of society—scions of ancient houses Anglo-Irish or Celtic, some prosperous Dublin merchants, and many young professional men who after the misfortunes of 1798 rose to eminent distinction in their own country, in France, or in the United States, without recant-

ing any of the principles of the United Irishmen. At first the society was constitutional and not secret: it was made a secret society in 1795, and steps were taken for the enrollment of men preparatory to a general insurrection when the promised aid in men and material should arrive from France. At the close of 1796 there were reported as enrolled 500,000 men, sworn members of the society, of whom 100,000 were more or less provided with arms—muskets and pikes. In the meantime Theobald Wolfe Tone, Arthur O'Connor, Lord Edward Fitzgerald, and other agents of the society had been busy in France, and the directory had given them assurance that aid would be forthcoming. In 1796, Dec. 16, a fleet of 17 sail of the line, 13 frigates, and 13 smaller ships bearing 15,000 French troops sailed for Ireland from Brest, commanded by Gen. Hoche, Grouchy second in command: this expedition, defeated by continuous violent storms, had to return home without effecting a landing in Ireland. In the spring of 1797 adverse winds prevailing for weeks prevented the sailing of a joint expedition of troops of the French and Batavian republics for Ireland. Bonaparte's armée d'Angleterre was made an 'army of Egypt' in the spring of 1798, and the long-planned insurrection in Ireland, started without any prospect of aid from France, met with inevitable defeat. After suppression of the insurrection, which was confined to three of the 32 counties, by an armed force of 137,000 men, the chief leaders of the United Irishmen in Dublin and Belfast were first confined in a fortress for four years and then banished; very many of the exiles settled in the United States. Of the 20 leaders confined in Fort George the religious affiliations were: Episcopalians, 10; Presbyterians, 6; Catholics, 4.

UNITED KINGDOM OF GREAT BRITAIN AND IRELAND, the legal and official designation of the British Islands, since the union of the three kingdoms of England. Scotland, and Ireland, 1801. See GREAT BRITAIN; UNION, LEGISLATIVE, of Great Britain and Ireland, etc.

UNI'TED METH'ODIST FREE CHURCH. See METHODISTS (British.)

UNITED ORDER OF THE GOLDEN CROSS, THE: a benevolent and fraternal society, organized at Knoxville, Tenn., 1876, July 4. It was the first organization of this kind to admit women on an equality with men. The order has 27,000 members and a total income of $561,359.

UNITED ORDER OF PILGRIM FATHERS, THE: a fraternal and patriotic organization with headquarters at Lawrence, Mass. It had a membership of 20,000 and an annual income of $500,000 in 1908. In the same year the order paid $473,000 in benefits.

UNI'TED PRESBYTE'RIAN CHURCH: religious body in Scotland, constituted 1847 by amalgamation of the SECESSION and RELIEF CHURCHES.

THE SECESSION CHURCH.—The Prot. Reformation in Scotland was very emphatic and decisive in regard to both the doctrine and the government of the church. The people became strongly Calvinistic and Presbyterian and the efforts of King James to supplant their system by Episcopacy proved unavailing, so far as the great body of the commons and gentry were concerned; though, from various considerations, many of the Scottish nobles adopted the church principles of their sovereign, and after the Restoration (1660) supported the governments of Charles and James in their persecution of the Covenanters: see COVENANTS: SCOTLAND: SCOTLAND, CHURCH OF. At the meeting of the Scottish Estates 1690, Episcopacy, which in Scotland had obtained temporary supremacy under the rule of Sharp (q.v.) and Lauderdale, was abolished, and Presbyterianism (q.v.) re-established. But after the 'glorious revolution' the spirit of the nation underwent a great change in regard to religion; and the new latitudinarianism of the times appears in the fact that hundreds of Episcopalian curates were allowed to retain the parishes in which they had been arbitrarily stationed, on subscribing the Confession of Faith; and great numbers of Episcopalian laymen became elders in a church whose strict adherents they had themselves recently hunted even to death. Bp. Burnet describes these curates as 'the worst preachers I ever heard, ignorant to a reproach, and many of them openly vicious.' In 1712, when the obnoxious *Law of Patronage* was restored, the triumph of the 'court' or 'Moderate' party in the church was complete: see MARROW CONTROVERSY. Violent settlements of curates, effected by the agency of dragoons, became frequent; and the petitions and appeals of the people against them were disregarded by the gen. assembly, and in 1730 were even rebuked. The Rev. Ebenezer Erskine (1732) publicly denounced this ecclesiastical tyranny and he, with 3 other ministers, having refused to retract after admonition and censure—first by his synod, and then on appeal to the gen. assembly—were (1733) declared 'no longer ministers of the church.' Thereupon they protested that they were obliged to 'make a secession.' (See ERSKINE, EBENEZER.) This was the origin of the famous Secession Church, which has made so deep an impress on the religious life of Scotland. Erskine and his friends published a statement of their reasons for separation, under the title *A Testimony to the Doctrine, Worship, Government, and Discipline of the Church of Scotland, or Reasons (by the Four Brethren) for Their Protestation entered before the Commission of the General Assembly.* This document, afterward known as the 'First or Extrajudicial Testimony,' shows that it was not only the odious 'law of patronage' that induced Erskine and his friends to leave the church of their fathers; but an accumulation of grievances that in their eyes had become insupportable. What the 'four brethren' sought

was the vindication of what they held to be evangelical truth. So much popular indignation was excited by the deposition of the 'four brethren,' that the 'Moderate party' thought it best to make some concessions to the 'Evangelicals' or 'Marrow party.' Accordingly, the gen. assembly 1734 empowered the 'synod of Perth and Stirling' to remove the censures from the four brethren; but Mr. Erskine declined to be 'reponed;' and published his reasons. In 1736, Dec., appeared the pamphlet entitled *An Act, Declaration, and Testimony for the Doctrine, Worship, Discipline, and Government of the Church of Scotland,* commonly known as the 'Judicial Testimony,' which is a sort of survey of the whole ecclesiastical history of Scotland from the Reformation. In 1737 four other ministers joined the original 'four.' The church authorities now resolved to proceed to extremities against the seceders; and after one final effort to win them back, the gen. assembly of 1740 solemnly pronounced their deposition. In spite of the frequent refusal of sites for churches, and other modes of persecution, the Secession Church prospered.

In 1747 a rupture or 'breach,' took place in the new body on the question of the burgess-oath, some affirming that this oath could not be taken by any consistent Seceder, and others insisting that it could, and that the question regarding it ought to be a matter of mutual forbearance. The party condemning the religious clause in the burgess-oath formed the *General Associate Synod,* or, popularly, the *Anti-burgher Synod;* the party tolerating it, the *Associate* or *Burgher Synod.* Subsequently a second split occurred in each of these; and two other minor denominations were formed—one assuming the designation of the *Constitutional Associate Presbytery,* or *Old Light Anti-burghers* (1806); and the other the designation of the *Original Burgher Presbytery,* or *Old Light Burghers* (1799). After holding aloof more than 70 years, the Burghers and Anti-burghers were solemnly reunited. At the date of the 'breach' (1747) the number of Secession congregations was 32; when the reunion took place (1820) it had increased to 262. Thereafter the Secession Church had uninterrupted prosperity. A certain change, however, began to show itself in the character and spirit of the denomination. Their *old-world look,* their interest chiefly in bygone events, their very language—like their sentiments—archaic, took on a modern aspect; they felt the new-born enthusiasm for foreign missions; and in 1847, at the union of the Secession and Relief Churches, the former was supporting a staff of more than 60 missionaries in different parts of the world. Further, the *Secession* Church began to assume an attitude more antagonistic to the Establishment; and a controversy between leading divines of the Establishment and of the Secession, known as the *Voluntary Controversy* (1829-34), served to strengthen the volun-

taryism of the Seceders (see VOLUNTARYISM), and brought them nearer to the Relief Church (see below). Next followed the *Atonement Controversy*, in which the Secession Church adhered to the liberal evangelical theology of the Marrow; in this also having sympathy of the Relief body. In 1847, May 13, the two churches formed themselves into one body, the UNITED PRESBYTERIAN CHURCH.

We now revert to the RELIEF CHURCH. After the expulsion of Erskine and his friends from the Church of Scotland, the assemblies (packed with 'court of session elders') became more determinedly 'Moderate' than ever. They proceeded to deprive the people of all right to elect, or in any way to interfere with the election of, ministers. Never were forced settlements more shameless than about this period; and the demand for *Relief* took the form of a protest against the induction of a very unpopular minister to the parish of Inverkeithing, presbytery of Dunfermline (1749.) This protest, after much discussion, in presbytery and gen. assembly, resulted 1752 in the condemnation and deposition by the assembly of the Rev. Thos. Gillespie, for his leadership in a steadfast refusal to obey the order of the assembly to proceed with the unpopular induction—the order being addressed to the presbytery of Dunfermline. Thus the *Relief Church* was founded on an assertion of the right of congregations to elect their own ministers. 'Societies' (as in the case of the Seceders) sprang up in many places, and were gradually formed into congregations; though the Relief had long to sustain a severe attack from the Seceders and the Reformed Presbyterians, for their adherence to the latitudinarian principle of 'free communion,' i.e., of holding Christian fellowship at the Lord's table with other denominations. At the union 1847 the Relief numbered 113 congregations, while the Secession numbered 384 congregations; so that the UNITED PRESBYTERIAN CHURCH began with 497 churches and a membership estimated at more than 140,000.

UNITED PRESBYTERIAN CHURCH.—The career of this church as a corporate body has been prosperous. In doctrine it adheres (like all the other Presb. churches of Scotland) to the Westminster Confession of Faith and the Larger and Shorter Catechisms, 'it being always understood that we do not approve of anything in these documents which teaches, or may be supposed to teach, compulsory or persecuting and intolerant principles in religion'—a qualification supposed to refer particularly to the 23d chapter of the Confession of Faith. Its form of church government is Presbyterian; but, unlike the Established and Free Churches, it has no intermediate courts (synods) between presbyteries and the supreme court, the latter of which it designates not as a Gen. Assembly, but only as a Synod; though, in fact, it partakes more of the nature of a 'general' assembly than the

bodies known by that name, since it is really an assembly of the whole clergy of the denomination, with one elder from each kirk-session. (See SCOTLAND, CHURCH OF: FREE CHURCH OF SCOTLAND: PRESBYTERIANISM.) It has a Theological Hall and Library in Edinburgh, and a staff of professors. The U. P. Church is now, both in practice and in theory, a voluntary church, having by long experience of practical voluntaryism reached the conviction that Christianity is best served by total separation of church and state. Although with less wealth than the Established and Free Churches, the United Presbyterian Church has not been inferior in its general liberality. In 1875 about 100 congregations of the United Presbyterian Church formed in England were transferred by the mother church in Scotland to the 'Presbyterian Church in England.' Since the separation of its English branch the United Presbyterian Church still counts about 550 congregations and 175,000 membership. Protracted negotiations for union between the United Presbyterian and Free Churches were without result, until 1900, when the two bodies were united as the United Free Church.

UNITED PRESBYTERIAN CHURCH OF NORTH AMERICA: denomination formed by the organic union of two previously distinct Presby. bodies, the 'Associate Presbyterian Church' and the 'Associate Reformed Presbyterian Church.'

The *Associate Reformed Chh.* in the United States represented a union of Irish and Scotch Presbyterians belonging to the Secession Chh. of Scotland and to the Chh. of the Covenanters or Reformed Presbyterians respectively. The people were settled mostly in Virginia, Pennsylvania and New Jersey. The union was consummated at a meeting of presbyters of the two churches named, and of some Burgher presbyters (another small branch of Scotch Presbyterianism), at Philadelphia, 1782, Oct. There was formed a synod, styled Associate Reformed Synod of North America. From its chief stronghold in the Cumberland valley of Pennsylvania, the Associate Reformed Chh. sent colonies to the Carolinas, Georgia, Kentucky, and to New York, Maine, and New Hampshire. When this church coalesced with the Associated Presbyterian Chh. 1858, to form the United Presbyterian Church, it had 4 synods, 28 presbyteries, 253 ministers, 31,284 communicants.

The *Associate Presbyterian Chh.* came into existence 1782, as a protest against the 'Declaration and Testimony' of the Associate Reformed. It early had a valuable accession of strength in ministers sent out from Scotland; to it also, after a while, gravitated many sternly orthodox Presbyterians, ministerial and lay, from the Associate Reformed fold. Its first synod (1801) consisted of 17 ministers, divided into 4 presbyteries. There was a serious division, even an organized secession, of the more strict venerators of Scotch orthodoxy 1840;

but the erring brethren were taken back into the fold 1854. At the formation of the United Presbyterian Chh. 1858, the Associated Synod comprised 21 presbyteries, 231 ministers and licentiates, 23,505 communicants: thus had the insignificant band of seceders from the Associate Reformed Chh., 1782, grown to almost as large proportions as its rival.

The union forming the United Presbyterian Church was effected 1858, May, on the doctrinal basis of the Westminister Confession of Faith (with a very slight modification) and the Westminster Catechisms, and on a 'Testimony' comprising 18 articles relating to conduct, terms of communion, etc. Among the points of the testimony was the denunciation of slave-holding (long before condemned in the uniting churches) as sinful; condemnation of secret oath-bound societies; restriction of the song-service to the use of the Bible psalms; denial of communion in saving ordinances to persons who refuse to adhere to the church's profession of faith. In 1868 the gen. assembly gave an interpretation on 'communion in saving ordinances,' leaving the matter to the discretion of sessions. A report published at the first general assembly, held in Xenia, O., 1859, May, showed 55,547 members, in 634 congregations, served by 408 ministers, in 42 presbyteries. The same general assembly constituted the following boards for conducting the operations of the chh.: foreign missions, home missions, publication, church extension, education. Later, to these were added boards of freedmen's missions and of ministerial relief. An improved metrical version of the psalms was approved by the general assembly for use in public worship 1871. The assembly also declared the church prohibition of instrumental music in worship repealed: instruments are being introduced into many of the leading churches.

It has been distinguished for the careful training of its ministry. It has in its connection two theological seminaries and six colleges. For the execution of its work the United Presbyterian Church has seven boards, namely, home, foreign, freedmen's mission, church erection, publication, education, and ministerial relief. Its foreign mission work has been extensively carried on in Trinidad, Syria, India, Egypt, and China.

In 1908 there were in the United States 487 ministers, 960 churches, and 127,205 communicants. The membership is strongest in Pennsylvania, nearly 50 per cent, this state with Ohio and New York having about two-thirds of the total membership.

UNITED PROVINCES. See NETHERLANDS.

UNITED STATES OF AMERICA, THE: a republic in North America bounded on the n. by Canada, e. by the Atlantic Ocean, s. by Mexico and the Gulf of Mexico, and w. by the Pacific Ocean. In 1909 it comprised 46 states, 5 territories and various outlying possessions scattered throughout the world. It was originally composed

of 13 states, to which others were added from time to time, all of which up to 1909 were made up from contiguous territory on the mainland of North America. The states, in the order of their ratification of the federal constitution and of their admission to the federal union, according to the dates of the U. S. census of 1900, are:

States.	Admitted.	States.	Admitted.
Delaware	1787, Dec. 7	Missouri	1821, Aug. 10
Pennsylvania	1787, Dec. 12	Arkansas	1836, June 15
New Jersey	1787, Dec. 18	Michigan	1837, Jan. 26
Georgia	1788, Jan. 2	Florida	1845, Mar. 3
Connecticut	1788, Jan. 9	Texas	1845, Dec. 29
Massachusetts	1788, Feb. 6	Iowa	1846, Dec. 28
Maryland	1788, Apr. 28	Wisconsin	1848, May 29
So. Carolina	1788, May 23	California	1850, Sep. 9
New Hampshire	1788, June 21	Minnesota	1858, May 11
Virginia	1788, June 26	Oregon	1859, Feb. 14
New York	1788, July 26	Kansas	1861, Jan. 29
No. Carolina	1789, Nov. 21	West Virginia	1863, June 19
Rhode Island	1790, May 29	Nevada	1864, Oct. 31
Vermont	1791, Mar. 4	Nebraska	1867, Mar. 1
Kentucky	1792, June 1	Colorado	1876, Aug. 1
Tennessee	1796, June 1	North Dakota	1889, Nov. 1
Ohio	1803, Feb. 19	South Dakota	1889, Nov. 1
Louisiana	1812, Apr. 30	Montana	1889, Nov. 8
Indiana	1816, Dec. 11	Washington	1889, Nov. 11
Mississippi	1817, Dec. 10	Idaho	1890, July 3
Illinois	1818, Dec. 3	Wyoming	1890, July 11
Alabama	1819, Dec. 14	Utah	1896, Jan. 4
Maine	1820, Mar. 15	Oklahoma	1907, Nov. 16

Territories.	Organized.	Territories.	Organized.
New Mexico	1850, Sep. 9		
Arizona	1863, Feb. 24	Dist. of Alaska	1868, July 27
Dist. of Columbia	1790, July 16 1891, Mar. 3	Hawaii	1900, June 14

The Philippines are under a provisional civil government, Guam and Tutuila under governors, and the Panama strip under a commission. The president appoints all these officials.

Location and Area.—The territory on the North American mainland, included in the United States, excepting Alaska, is in latitude 24° 20′ to 49° n., longitude 66° 48′ to 124° 32′ w.; the extreme width e. to w. is 3,100 m.; extreme length n. to s. 1,780 m. The Atlantic coast line is 2,163 m.; Gulf of Mexico 1,764 m.; Pacific coast line 1,343 m.; total 5,270 m. The areas of the states, etc., according to the figures of the census of 1900 are:

STATES AND TERRITORIES	GROSS AREA IN SQ. MILES	CAPITAL
Alabama	52,250	Montgomery
Alaska Ter	590,884	Juneau
Arizona Ter	113,020	Phoenix
Arkansas	53,850	Little Rock
California	158,360	Sacramento
Colorado	103,925	Denver
Connecticut	4,990	Hartford
Delaware	2,050	Dover
District of Columbia	70	Washington

Engraved by the Atlas Eng., Co.
Longitude West from Greenwich
Acquired by Discovery 1792
by Exploration 1805
and by Florida Treaty 1819
by Astoria Settlement 1811
OREGON
WASHINGTON
Olympia
Portland
Columbia R.
Salem
Boise
Helena
MONTANA TERRITORY
NORTH DAKOTA
SOUTH DAKOTA
Bismarck
Fargo
Pierre
Yellowstone R.
Missouri R.
Purchased from France 1803
WYOMING
NEBRASKA
Cheyenne
Omaha
Lincoln
Platte R.
Ogden
Great Salt L.
Salt Lake City
Sacramento
San Francisco
Carson
NEVADA
UTAH
CEDED BY MEXICO 1848
COLORADO
Denver
Leadville
Santa Fe
Los Angeles
ARIZONA
San Diego
Gila R.
Phoenix
Colorado R.
Gadsden Purchase 1853
CEDED BY TEXAS 1850
TEXAS
El Paso
Rio Grande
Austin
Galveston
TEXAN ANNEXATION 1845
Dallas
Red R.
Shreveport
Guthrie
OKLAHOMA
ARKANSAS
Wichita
Kansas
Arkansas R.
Topeka
Kansas City
Jefferson City
Springfield
LOUISIANA PURCHASE
IOWA
Des Moines
Little Rock
Memphis
Jackson
Mississippi R.
Louisiana
Baton Rouge
New Orleans
Mobile
Montgomery
ALABAMA
Tallahassee
GULF OF MEXICO
Ceded by SPAIN 1819
FLORIDA
Key West
C. Sable
BAHAMA ISLANDS
Atlanta
GEORGIA
Savannah
Charleston
SOUTH CAROLINA
Columbia
C. Fear
Raleigh
NORTH CAROLINA
C. Hatteras
Nashville
TENNESSEE
Louisville
KENTUCKY
Frankfort
Indianapolis
Indiana
Columbus
Springfield
Cincinnati
Pittsburg
Cleveland
Lake Erie
Buffalo
L. Ontario
Lansing
Detroit
Toledo
Lake Michigan
Lake Huron
Milwaukee
Madison
Chicago
WISCONSIN
Minneapolis
St. Paul
MINNESOTA
Lake Superior
Ottawa R.
Ottawa
Montpelier
VERMONT
Albany
NEW YORK
Hartford
CONN.
MASS.
Boston
Concord
N. HAMP.
MAINE
Augusta
Trenton
New York
Philadelphia
Baltimore
C. Charles
Annapolis
WASHINGTON
St. Louis
Missouri R.
Lake of the Woods
ORIGINAL UNITED STATES
1783
OPEN AREA
TERRITORY NORTHWEST OF THE
MAP OF THE
UNITED STATES
SHOWING
ACQUISITION OF TERRITORY
Scale of Miles
0 50 100 200 300 400
ARCTIC OCEAN
ASIA
ARCTIC CIRCLE
Yukon R.
Behring Strait
Nome
St. Michaels
BERING SEA
ALEUTIAN ISLANDS
PACIFIC OCEAN
DOMINION OF CANADA
Juneau
Sitka
ALASKA
1867
PORTO RICO
1899
ATLANTIC OCEAN
San Juan
PORTO RICO
Ponce
CARIBBEAN SEA
TUTUILA
Part of SAMOA ISLANDS
1900
OFOO
TAU
MANUA
ROSE I.
WAKE ID.
1898
WAKE I.
GUAM ISLAND
1899
HAWAIIAN ISLANDS
1898
PACIFIC OCEAN
PHILIPPINE ISLANDS
1899
PHILIPPINE
LUZON
Manila
CHINA SEA
MINDORO
SAMAR
PALAWAN
PANAY
NEGROS
PARAGUA
SULU OR MINDORA SEA
MINDANAO

STATES AND TERRITRORIES	GROSS AREA IN SQ. MILES	CAPITAL
Florida	56,680	Tallahassee
Georgia	59,475	Atlanta
Idaho	84,800	Boisé
Illinois	56,650	Springfield
Indiana	36,350	Indianapolis
Iowa	56,025	Des Moines
Kansas	82,080	Topeka
Kentucky	40,400	Frankfort
Louisiana	48,720	Baton Rouge
Maine	33,040	Augusta
Maryland	12,210	Annapolis
Massachusetts	8,315	Boston
Michigan	58,915	Lansing
Minnesota	83,365	St. Paul
Mississippi	46,810	Jackson
Missouri	69,415	Jefferson City
Montana	146,080	Helena
Nebraska	77,510	Lincoln
Nevada	110,700	Carson City
New Hampshire	9,305	Concord
New Jersey	7,815	Trenton
New Mexico Ter.	122,580	Santa Fé
New York	49,170	Albany
North Carolina	52,250	Raleigh
South Dakota	70,795	Bismarck
Ohio	41.060	Columbus
Oklahoma	70.057	Guthrie
Oregon	96,030	Salem
Pennsylvania	45,215	Harrisburg
Rhode Island	1,250	Providence
South Carolina	30.570	Columbus
South Dakota	77,650	Pierre
Tennessee	42.050	Nashville
Texas	265,780	Austin
Utah	84,970	Salt Lake City
Vermont	9,565	Montpelier
Virginia	42,450	Richmond
Washington	69,180	Olympia
West Virginia	24,780	Charleston
Wisconsin	56,040	Madison
Wyoming	97,890	Cheyenne
Total United States	3,616,484*	

Philippines have 115,026; Porto Rico, 3,435; **Hawaii**, 6,449; Guam, 210; Panama Strip, 474, and Tutuila, 77.
*The gross area includes land and water.

Coast Lines.—The coast line is comparatively regular; there are no large indentations, but the largest and most numerous are on the Atlantic coast. The principal arms of the Atlantic are Chesapeake, Delaware, New York, Massachusetts, and Cape Cod bays, and Long Island, Albemarle, and Pamlico sounds. On the coast of the Gulf of Mexico are Mobile, Galveston, and Tampa bays; and on the Pacific coast San Francisco bay, Bay of Monterey, Puget sound, and Santa Barbara and San Pedro channels. (For coast lines of Alaska and the island possessions see articles on ALASKA; PHILIPPINES; HAWAII; PORTO RICO, etc.) There are no large islands off the coast of the main portion of the United States. Long Island (qv). is the largest; the next important are the islands off the n.e. Atlantic coast, and the Santa Barbara (q.v.) group

off the s.w. Pacific coast. Florida, in the s.e., is the largest peninsula. There are more good harbors on the Atlantic coast than on the Pacific or Gulf coasts.

Topography.—The main part of the United States presents four physical divisions; two elevated and two lowland regions. The elevated are the Appalachian Mountains in the east, and the Rocky Mountains or Cordillerian system in the west. The eastern lowland mass is along the Atlantic coast, broad at the Gulf of Mexico and narrowing towards the north, where the mountains are but a short distance from the ocean. The southern part of the Atlantic lowland joins the central lowland region south of the Appalachian Mountains, and about 70 m. from the Gulf of Mexico. It is much less in extent than the central lowland division but it contains a large population, is the oldest portion settled by Europeans and was the chief battle ground in the war for American independence. The northern and southern parts of this lowland section differ materially in formation and soil. The mountains in the northern part approach the ocean so that the foot-hills are almost at the sea line; the lowlands are in some places really series of low hills, masses of rocks, sandy soil, large areas covered deep with glacial deposits, and with masses of rock formation which show the marks of mighty ice-forces. Beginning with and including the southern portions of New Jersey, and continuing to the Gulf and Florida Strait, is a plain of low, almost level, land, extending in a gradual slope from the mountains to tide water. The soil and climate contribute to the extensive growth of fruits, tobacco, corn, and cotton. The northern section of the Atlantic lowland is a worn-down mountain region, and the southern section at no ancient period was sea-bottom and even now the line of demarcation between the coastal plain and the continental shelf is very slight in many places. This section has received the name of 'Tide Water Country,' on account of its being a gift to the continent from the sea, and also because many of its rivers are tidal streams for some distance from the ocean. The central lowland lies between and on the lower slopes of the two great uplifts. It is called the Mississippi Valley on account of the greater portion being in the basin of the Mississippi river. The mountain divide on the west to the Mississippi. There are numerous sand bars and swamp lands along the southern coast. The eastern slope is shorter and less steep as a whole than the western slope. There are high bluffs along many of the rivers of the western part, even in sections where there are large areas of rolling prairie lands. The huge boulders and mountain peaks of the northwest section seem like outposts on the beginning of the plateau region. In the southwest the lowlands extend around the southern part of many of the mountain chains, so that the greater part of the United States south of the low rocky hills which form

the extremity of the Appalachian Mountains, and extending west to the Guadalupe Mountains, is one continuous lowland mass. The mountains in Missouri and Arkansas, south of the Missouri river and just west of the Mississippi, are the most important highlands in this whole section. In Missouri these highlands are called Ozark Mountains or Ozark Plateau, in Arkansas Quachita Mountains.

Along the Pacific coast is a narrow strip of low land of not sufficient extent to be classed among the great physical divisions, but of great value from an economic point of view. The southern part of this lowland border is considerably wider than that of the northern part. The numerous parallel valleys, in some places valley arms, which are on the eastern border of the Pacific lowland strip, furnish a considerable area of productive farm lands.

The eastern uplift, the Appalachian Mountains, are the older and less extensive of the two great highland sections of the United States. (See APPALACHIAN MOUNTAINS.) They consist chiefly of mountain ranges which are nearly parallel with the Atlantic coast, and extend from near the Gulf of Mexico north into Canada. Nearly all of the western part of the United States, beginning about the 104th meridian, belongs to the Rocky Mountain region. (See ROCKY MOUNTAINS.) This portion of the United States has a greater altitude and extent than the mountain lands of the Atlantic region. The Rocky Mountains extend from Mexico to Canada. The ranges which constitute this group are by no means as regular in arrangement as are the Appalachian chains; some extend nearly parallel with the coast; many lofty ranges are at almost right angles with the north and south ranges, and others run northeast and southwest. Enclosed by ranges of these mountains are the Great Basin and the Yellowstone Park. The Great Basin region is a series of basins isolated to all appearances from each other so far as drainage lines, and differing in soil and geological formation. The chief basins are the Carson, Humboldt, and Great Salt Lake. The mountain ranges within the Great Basin trend mostly north and south. The vast area of the volcanic region of the Rocky Mountains contains many extinct volcanoes. On both the eastern and western border are numerous high peaks connected by high plateaus. In the southern part or the portion drained by the Colorado river, is a region of high plateaus crossed by streams which flow through deep cañons, some of which are over 2,000 feet deep. The Grand Cañon (q.v.) of the Colorado is in places 6,000 feet deep.

Lakes and Rivers.—The great streams which constitute the drainage systems of the United States flow into the Atlantic, direct or through the Gulf of Mexico, and into the Pacific. The large river systems are the Mississippi,

the Saint Lawrence, the Columbia, and the Colorado. The Mississippi is the largest, including within its basin nearly all the region in the central lowland section, and a large area of the Rocky and Appalachian mountains. The chief tributary is the Missouri, which has a drainage area of about 530,000 sq.m. Next in drainage area is the Ohio river, the basin of which is over 200,000 sq.m.; the Arkansas, 185,671 sq.m.; the Red river, nearly 90,000 sq.m. The total area drained by the Mississippi, its tributaries, and other streams which enter the gulf, is 1,726,000 sq.m. The Rio Grande, which also enters the Gulf of Mexico, has one large tributary, the Pecos. Further streams which flow into the Gulf of Mexico are the small Colorado, the Brazos, and others in Texas, and several rivers in Mississippi, Alabama, and Georgia. The Mississippi and its tributaries are navigable for thousands of miles. To the great central waterways is due the early development of the interior of the United States, first as a section with trading posts and forts at convenient places on the navigable streams, and later as a farming and manufacturing region. West of the divide in the Rocky Mountains the drainage is to the Pacific Ocean. Nearly all the rivers, except those in the Great Basin, flow directly, or through a main stream to the open sea. The Colorado river enters the Pacific Ocean through the Gulf of California. The largest river of the Pacific basin is the Columbia. Some of the other important rivers are the Sacramento, San Joaquin, Klamath, and a number of short streams. The rivers in California and some of the other valleys follow the course of the valleys, but the Columbia, Colorado, and branches of the Columbia break through the mountains in several places, and thus form high waterfalls and series of cascades. The Columbia has several large tributaries, chief of which is the Snake river. The rivers of the Atlantic basin east of the Appalachians have mostly rapid currents, and have had great influence in the development of the manufacturing industries of the country. Many of the streams which flow into the Atlantic, or into wide bays which are arms of the ocean, are tidal streams for some distance inland. (See DELAWARE; HUDSON, etc.) The principal rivers of this basin are the Kennebec; Penobscot, and Manchester in the northeast; the Connecticut, which flows into Long Island sound; the Hudson, a magnificent stream, alike remarkable for its scenery and its navigable importance, which flows south for 300 m. and contributes to form the harbor of New York; the Delaware, which after a course of 300 m. enters the Delaware bay and is navigable for large steamers to Philadelphia, a distance of 40 m.; the Potomac, which flows into Chesapeake bay, and is navigable for the largest vessels to Washington, a distance, including the bay, of 200 m.; and the Savannah, which enters Savannah bay and is navigable for large vessels for 17 m., to the city of

Savannah, where it forms an important harbor. Besides the rivers, one of the most remarkable features of the United States, as also of Canada, is the chain of large fresh water lakes: Superior, Michigan, Huron, Erie, and Ontario. The lakes drain an area of about 90,000 sq.m., and send their waters into the Saint Lawrence, after precipitating the greater part of them in an accumulated mass over the renowned Falls of Niagara, which are between Erie and Ontario. The rivers of the United States which flow into the great lakes are of no great length. The chief streams are the rivers of northern New York and Vermont, some of which enter the Saint Lawrence river through Lake Champlain; the Genesee river in the west central part of New York, and a number of small streams which enter Lakes Erie, Huron, Michigan, and Superior. (See SAINT LAWRENCE RIVER.) The Red River of the North enters the Atlantic Ocean through Lake Winnipeg and the Hudson Bay. In the interior of the United States are many groups of small lakes which have been mentioned in articles on the different states and territories. The inland seas or salt-water lakes within the Great Basin are of special interest as being the remnants of large inland seas. The fresh-water lakes in the Appalachian section, and even the great lakes, were once much larger than at present. The chief characteristics of the whole drainage system of the United States are that by far the greatest portion of the waters are carried south or in a southern direction, and reach the Atlantic Ocean through the Gulf of Mexico. The great lakes, with their large outlet, the Saint Lawrence river, receive but a small portion of the drainage; their chief supply comes from the melting snows of the Rocky Mountains. The rivers which enter the Pacific are small streams, except the Columbia and Colorado. The Red River of the North is the largest stream which flows north.

Climate.—The main land-mass of the United States is in the temperate zone, and the climatic conditions of the whole country are about what is general in such zones modified chiefly by the great mountains and by the winds. The average annual temperature of the extreme southern part is 75° and of the extreme northern part, 50°. The average temperature for January in the extreme north (exclusive of Alaska) is about 20°; for July, about 60°. The mercury falls as low as 40° below zero in the northern part of Minnesota, and is sometimes as high as 120° in the hot, dry sections of Arizona and Texas. The west winds, which are prevalent in January, and which sweep over large interior areas, lower the temperature, frequently to the minimum. The difference in temperature of places in the same latitude on the Atlantic and Pacific coast is quite marked. That of the Pacific is much warmer than that of the Atlantic. The rainfall is generally the greatest in Washington, Oregon, and Florida, but the humidity is great in the southern portion of

Louisiana and other places along the Gulf coast. The region around the great lakes has not an excessive humidity; but it is subject to extreme and rapid changes in temperature. This region is also subject to extreme changes in the winds.

Geology.—In the northeastern portion of the United States metamorphic, Devonian, and igneous rock prevail. Old sandstone, or middle Devonian is found along the shores of the great lakes. Older Palæozoic groups are found in Ohio, Wisconsin, Tennessee, and in many parts of the Appalachian region. Along the Rocky Mountains, extending north and south, is a wide belt of cretaceous formations. Tertiary formations prevail in the basin sections of the Rockies; igneous rocks are in the northwest and metamorphic strata along the Sierras. From the Rio Grande almost to the Hudson, the Tertiary formation is prominent. The oldest rock systems, the Archæan and Algonkin are found among the Appalachians. They consist of hard, crystalline rocks, granites, marbles, geneisses, schists, etc. The same formations, igneous and metamorphic, are found in Wisconsin, Minnesota, and portions of the Dakotas. The western part of the United States is much younger than the eastern part. (See *Geology* in articles on the different states and Territories.)

Mineralogy.—Coal is mined in 33 states and a large area of unmined coal deposits is in the Rocky Mountains and Alaska. The anthracite coal is found in the eastern part of Pennsylvania and bituminous coal, varying in grade and value, in many other parts of the United States. East of the Rocky Mountains the total area of coal fields is about 222,000 sq.m. Wood was the great fuel article of commerce in the eastern part of the United States until about the middle of the 19th century. Bituminous coal was used to some extent as early as the middle of the 18th century, but the anthracite coal fields of Pennsylvania were scarcely known until about 1800. The federal census of 1900 shows that the output of bituminous coal has doubled every decade since 1870. Natural gas was in use in New York as early as 1868, and in western Pennsylvania in 1875. In a few years the value of the output of the natural gas fields of Pennsylvania was nearly $19,300,000. Other states producing natural gas are Ohio, Indiana, West Virginia, Kansas, and the southwestern part of New York. The production of petroleum in the United States began about 1859. Until 1897 the United States was the great petroleum producer of the world. In 1897 Russia's supply exceeded that of the United States. In 1872 the petroleum product of the United States was 6,293,194 barrels; in 1907 it was 126,493,936 barrels of 43 gallons each. The petroleum-producing states are Pennsylvania, Ohio, West Virginia, Indiana, California, Texas, and Louisiana. Iron ore is found in nearly every state in the Union. The regular

mining of iron ore is carried on in 25 states. Iron was one of the metals mined in the early years of the colonization and settlement of the country. In 1850 the total iron production was 1,560,442 tons (long). In 1907 the amount of the output was nearly 52,955,070 long tons, valued at the mines at nearly $118,000,000.

In the discovery and colonial days gold was found in the United States, but gold mining in the United States really began in 1848 when placer gold was discovered in California. Gold mines exist in nearly all the Rocky Mountain states and territories, including Alaska, and considerable gold has been mined in the eastern part of the country. Silver had been mined prior to 1850 only in small quantities. The discovery and development, in 1859, of the rich Comstock Lode, in the western part of Nevada, directed attention to the vast silver deposits in the Rocky Mountains. For several years succeeding the discovery of silver in Nevada, the United States was the great silver-producing country of the world. Mexico has vast silver deposits equal to if not greater than those in the United States. Colorado, Montana and Utah have extensive silver mines. (See SILVER.) The existence of copper on the south shore of Lake Superior was known as early as the 17th century; but the development of the mines which constitute the present extensive copper works of northern Michigan, began in 1845. Since 1880 copper mines have been opened in Arizona and Montana.

Other states producing copper to any extent are Utah and California. The United States ranks first in the production of copper and of lead. As early as 1720, lead was mined in a crude way in Missouri. In 1825 lead mines were opened in Wisconsin, Iowa, and Illinois, in the region near Dubuque. Lead is mined in several of the Rocky Mountain states, chiefly Colorado, Idaho, and Utah. Silver is found in many lead mines of the mountain region. In Missouri and other portions of the Mississippi valley, zinc is found in the sections containing lead deposits. Zinc was mined in the eastern part of the country, particularly in the northern part of New Jersey, as early as 1850. The United States ranks second in the world in the amount of value of zinc produced annually, and is a competitor with Spain for first rank in the quicksilver product. Mining of quicksilver began in 1845, in California, thus antedating the gold mining in that state. Clay suitable for pottery, tile, and brick is found in many parts of the country. The states which produce the greatest amount of clay products are Ohio, Pennsylvania, New York, New Jersey, and Illinois. In 1901 one half of the aluminum of the world was produced in the United States. Salt is found in Michigan, New York, Kansas, Ohio, California, Louisiana, Utah, and Nebraska. Portland cement is found chiefly in Pennsylvania and New Jersey; gypsum in Michigan, Kansas, Iowa, New York, and Ohio. The United States ranks first in phosphate

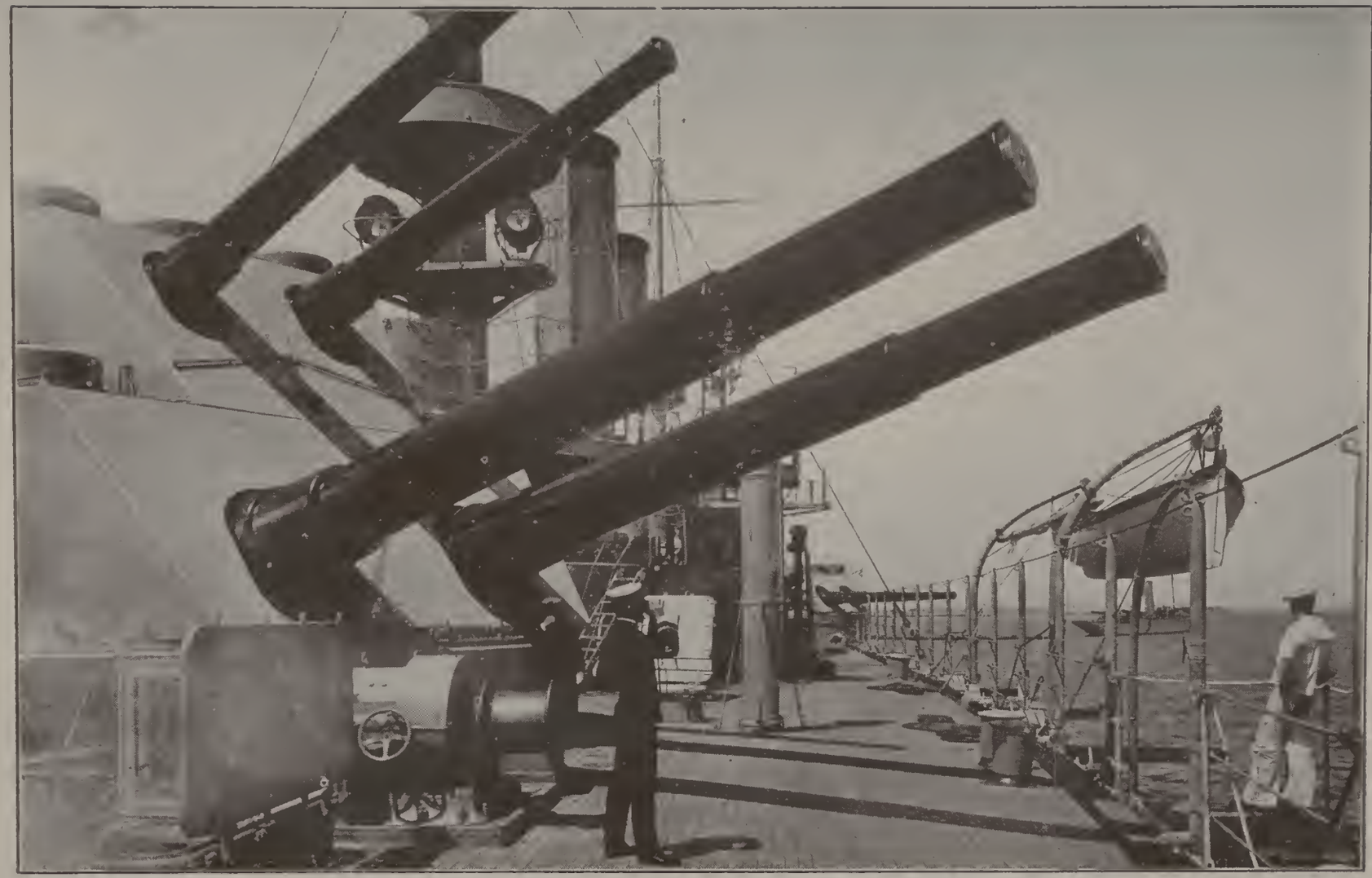
rock. It is found chiefly in South Carolina, and Tennessee. A great variety of stones suitable for building purposes is found in nearly all parts of the United States. Some of the most important are marble and granite; limestone, sandstone, slate, and trap-rock are the most common stones. Mineral springs are found in many sections, and large quantities of the waters are bottled for shipment to all parts of the world. California, Utah, Indian Territory, Kentucky, and Texas produce a considerable amount of asphaltic products, such as asphaltum, gilsonite, asphaltic limestone, and bituminous sandstone. Near Lake Champlain, N. Y., and in Alabama, Georgia, and Pennsylvania is found graphite. Other products found in various sections are mineral paints, soapstone, borax, manganese ore, talc, and pyrite.

Flora.—The forest sections of the United States have been treated in detail in articles on AMERICA, MAINE, MICHIGAN, WISCONSIN, WASHINGTON, NORTH CAROLINA, etc. The variety of the species of trees found in the United States is greater than is found in Europe, although nearly all of the European species are here duplicated. The endogens predominate in the United States as a whole, but exogens of considerable size and variety are found in the southern part. The flora of the Atlantic and Pacific basin differ considerably in species and variety. On the treeless plains of the Mississippi basin the native grasses and small plants are different in species or, if of the same species, they are different in variety from those in other parts of the country.

Fauna.—The animals of the U. S. are practically those that are found in the northern part of America. See AMERICA.

Population.—(1790) white 3,172,006; free colored 59,527, slave 697,681, total 3,929,214; (1800) white 4,306,446, free colored 108,435, slave 893,602, total 5,308,483; (1810) white 5,862,073, free colored 186,446, slave 1,191,362, total 7,239,881; (1820) white 7,862,166, free colored 233,634, slave 1,538,022, total 9,633,822; (1830) white 10,537,378, free colored 319,599, slave 2,009,043, total 12,866,020; (1840) white 14,195,805, free colored 386,293, slave 2,487,355, total 17,069,453; (1850) white 19,553,068, free colored 434,495, slave 3,204,313, total 23,191,876; (1860) white 26,922,537, free colored 488,070, slave 3,953,760, total 31,443,321; (1870) white 33,589,377, colored 4,880,009, total 38,558,371; (1880)—excluding Alaska and Ind. Terr.—50,155,783; (1890) 62,885,548; (1900) 76,303,387.

The centres of population as determined by the censuses were: (1790) 39° 16′.5 n. lat., 76° 11′.2 w. long., about 23 m. e. of Baltimore; (1800) 39° 16′.1 n. lat., 76° 56′.5 w. long., 18 m. w. of Baltimore; (1810) 39° 11′.5 n. lat., 77° 37′.2 w. long., 40 m n.-by-w. of Washington; (1820) 39° 5′.7 n. lat., 78° 33′ w. long., 16 m. n. of Woodstock, Va.; (1830) 38° 57′.9 n. lat., 79° 16′.9 w.



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UNITED STATES NAVY.

Double Turret on the Battleship "New Jersey" with two 12-inch guns and two 8-inch guns.

long., 19 m. w.s.w. of Moorefield, W. Va.; (1840) 39° 02′ n. lat., 80° 18′ w. long., 16 m. s. of Clarksburg, W. Va.; (1950) 38° 59′ n. lat., 81° 19′ w. long., 23 m. s.e. of Parkersburg, W. Va.; (1860) 39° 04′ n. lat., 82° 48′.8 w. long., 20 m. s. of Chillicothe, O.; (1870) 39° 12′ n. lat., 83° 35′.7 w. long., 48 m. e.-by-n. of Cincinnati, O.; (1880) 39° 4′.1 n. lat., 84° 39′.7 w. long., 8 m. w.-by-s. of Cincinnati; (1890) 39° 11′ 56″ n. lat., 85° 32′ 53″ w. long., 20 m. e. of Columbus, Ind.; (1900) 39° 9′.5 n. lat., 85° 48′.9 w. long., 6 m. s.e.e of Columbus, Ind.

COMMERCE.

The term 'Commerce,' as it is now understood, refers to the intercourse of nations, states, and communities for purchase of each other's products or manufactures, the superfluities of one nation or smaller division being given for those of another and then, if necessary, re-exchanged with still other nations or divisions according to their several wants.

The United States, in its official reports on commerce, presents a perfect and unique illustration of myriadal ramifications and intricacies of commerce on a large scale, wherein billions of dollars are involved continuously in capital and hundreds of millions in values of perfected products and raw material, also in which millions of persons, male and female, are constantly engaged in duties connected with these and voluminous business negotiations and transactions.

Customs Receipts.—An official statement, for example, on the Federal receipts and expenditures of the United States for 1908 shows an aggregate of receipts from customs duties amounting to $285,680,653. In this connection it is interesting to note that the receipts from customs, 1800, amounted to $9,000,000; 1870, $195,000,000; 1880, $187,000,000; 1890, $230,000,000; 1900, $233,000,000; 1905, $262,000,000; 1906, $300,657,413; 1907, $333,230,126.

Internal Revenue.—As internal revenue deals with several phases of commerce, notably, the sale of liquor and other revenue-producing products, it will be proper to include here the aggregate value of Federal collections under this heading. The official report for 1908 gives as the grand total of receipts from internal revenue sources, $250,714,008. The total in 1800 was $809,397. In 1870 the amount was $184,899,756; 1880, $124,009,374; 1890, $142,606,706; 1900, $295,327,927; 1906, $249,063,868; 1907, $270,309,388.

Imports of Merchandise.—In the field of merchandise imports and exports, free and dutiable, except gold and silver, the aggregate amount reported as value, 1908, is $1,194,341,792, a decrease of $240,000,000 from 1907.

Exports of Merchandise.—The grand total of domestic and foreign export values, 1908, is shown as $1,860,773,-

346, a decrease of $20,000,000 from 1907. Of this amount, $1,834,786,357 represents domestic exports.

Imports and Exports of Gold and Silver.—Although gold and silver, when in use, belong properly to the dominion of finance, the imports and exports of the precious metals come under the general heading en transit as commerce. The gold imports of the United States, 1908, reached the total of $148,337,321. The silver imports, 1908, amounted to $44,658,097. The gold exports, 1908, reached $72,432,924. The silver exports, 1908, are reported as aggregating $57,921,202.

VALUE OF IMPORTS INTO AND EXPORTS FROM THE UNITED STATES OF MERCHANDISE BY COUNTRIES, YEAR ENDED JUNE 30, 1908.

Countries.	Imports.	Exports.
Austria-Hungary	$ 15,425,659	$ 16,174,738
Azores and Madeira Islands	34,531	211,921
Belgium	19,895,677	52,938,582
Denmark	1,272,938	21,543,628
France	101,999,541	116,123,468
Germany	142,935,547	276,910,223
Gibraltar	11,048	371,365
Greece	3,019,666	1,290.804
Greenland, Iceland, etc	56,774	22,908
Italy	44,844,174	54,217.394
Malta, Gozo, etc	4,584	548,859
Netherlands	20,305,864	102,218.050
Norway	3,668,909	6,841.626
Portugal	4,967,922	3,086,072
Roumania	11,135	447,759
Russia in Europe	11,113,421	16.342,377
Servia	52,353	3,806
Spain	14,152,712	21,906.379
Sweden	4,633,672	9,671,810
Switzerland	24,698,036	646,840
Turkey in Europe	4,554,509	1.418.024
Great Britain and Ireland	190,355,475	580,663,522
Bermuda	455,546	957,066
British Honduras	737,389	1,299,145
British North America:	75,131.666	167,035,947
Newfoundland and Labrador	1,169,060	3,587,748
Central American States:		
Costa Rica	4,405.165	2,696,744
Guatemala	2,390,167	1,730,700
Honduras	2,268,070	1,768,995
Nicaragua	1,160,832	1,574,879
Panama	1,469,344	18,232,666
Salvador	981,715	1,357,297
Mexico	46,945,690	55,509,604
Miquelon, Langley, etc	137	45,687
West Indies:		
British	12.129.350	12,475,324
Cuba	83,284,692	47,161,306
Danish	592,292	727,193
Dutch	361,966	706,210
French	60,111	1,455,701
Hayti	689,045	3,649.172
San Domingo	4,583,661	2,703.276
Argentine Republic	11,024,098	31.858.155
Bolivia	384	1.226.238
Brazil	74.577.864	19,490.122
Chile	14,777.811	9.194,650
Colombia	$ 6,380.755	$ 3,452.375
Ecuador	2,401,188	1,909,126

UNITED STATES OF AMERICA.

VALUE OF IMPORTS INTO AND EXPORTS FROM THE UNITED STATES OF MERCHANDISE BY COUNTRIES, YEAR ENDED JUNE 30, 1908.

Countries.	Imports.	Exports.
Guianas:		
British	230,828	1,988,385
Dutch	780,369	645,417
French	33,136	334,174
Paraguay	14,645	100,568
Peru	6,670,616	6,959,579
Uruguay	1,364,796	3,868,661
Venezuela	6,725,184	2,555,863
Aden	1,615,261	1,097,277
Chinese Empire	26,020,922	22,343,671
British China	28,169	7,641
French China	14,400	.....
German China	536,329	470,731
Japanese China	.....	8,198,896
British East Indies	61,489,287	11,886,858
Dutch East Indies	14,095,364	2,181,952
French East Indies	.....	602,169
Hong Kong	2,129,256	8,975,161
Japan	68,107,545	41,432,327
Korea	3,045	1,563,113
Persia	529,492	3,885
Russia, Asiatic	341,627	2,072,915
Siam	51,858	392,663
Turkey in Asia	6,205,061	555,376
All other Asia	.....	211
British Australasia	11,186,668	28,280,661
New Zealand, etc	3,040,168	6,502,362
French Oceanica	543,193	346,504
German Oceanica	54,406	56,212
Philippine Islands	10,164,223	11,461,732
British West Africa	91,271	2,055,046
British South Africa	1,760,350	7,847,045
British East Africa	655,534	354,637
Canary Islands	83,521	685,591
French Africa	498,045	1,545,145
German Africa	.....	120,064
Liberia	1,035	58,432
Madagascar	1,907	15,979
Morocco	262,396	8,468
Portuguese Africa	67,935	5,463,949
Spanish Africa	.....	9,139
Turkey in Africa—Egypt	12,863,051	2,126,383
Tripoli	1,614	3,010
Total	$1,194,341,792	$1,860,773,346

Transportation of Imports.—The value of imports brought to the United States in American vessels, 1906, was $168,488,129; in foreign vessels, $971,397,270. This reveals the fact that American vessels carried 14.8 per cent. of the imports brought in.

In addition to the above transportation values, imports to the value of $86,677,047 were transported by land vehicles.

Transportation of Exports.—The value of exports shipped from the United States in American vessels, 1906, was $153,859,076; in foreign vessels, $1,396,270,084; percentage of exports from United States carried in American vessels, 9.9 per cent; transported by land vehicles, $193,733,340.

Value of Imports and Exports, by Principal Customs

Districts.—The imports received at Boston, 1908, were valued at $93,678,716; exports shipped from Boston, $96,051,668; received at New York, $688,215,938; shipped, $701,062,913; received at Philadelphia, $63,432,007; shipped, $109,261,436; received at Baltimore, $29,477,101; shipped, $80,988,505; received at New Orleans, $42,785,646; shipped, $159,455,773; received at San Francisco, $48,251,476; shipped, $28,000,000.

Other Details Regarding Imports and Exports.—The exports of domestic cotton, 1908, weighed 3,816,998,693 pounds, with a value of $437,788,202. Raw cotton imports weighed 71,072,855 pounds, with a value of $14,172,241. The weight of raw wool imported was 125,980,524 pounds. The value of unmanufactured silk imported is reported as $64,546,903; crude rubber, 85,225,073 pounds, valued at $37,753,266. The import of sugar weighs 3,371,997,112 pounds, with a value of $80,258,147. The weight of coffee imported was 890,640,057 pounds, valued at $67,688,106; tea, 94,149,564 pounds, valued at $16,309,870.

An important fact along certain lines in commerce are the steam and sailing vessels built and used largely for freighting of commercial products. The tonnage of such vessels built in the United States, 1908, was 614,216. The tonnage of American vessels engaged in foreign trade and whale fisheries, 1908, was 930,413; engaged in coastwise trade and cod and mackerel fisheries, 6,371,862.

TRANSPORTATION.

Railroads.—According to the latest Federal reports, covering a period when conditions were normal, the total mileage of railroads in the United States, 1905, was 271,341. This total represents the distance over which cars are actually operated. The increase over 1904 was 5,000 miles, and, over 1900, 23,000 miles.

Totals by Groups of States.—The mileage embraced in the New England states was 7,681; Middle Atlantic states, including New York, New Jersey, Pennsylvania, Delaware, Maryland, and the District of Columbia, 23,408; Central Northern states, including Ohio, Michigan, Indiana, Illinois, and Wisconsin, 43,959; South Atlantic states, including Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida, 24,180; Gulf and Mississippi Valley states, including Alabama, Mississippi, Tennessee, Kentucky, and Louisiana, 19,026; Southwestern states, including Missouri, Arkansas, Texas, Kansas, Colorado, New Mexico, Indian Country, and Oklahoma, 46,061; Northwestern states, including Iowa, Minnesota, Nebraska, North and South Dakota, Wyoming, and Montana, 35,157; Pacific states, including Washington, Oregon, California, Nevada, Idaho, Arizona, and Utah, 17,869.

Recapitulation of Group Totals.—The largest group total is that of the Southwestern states, the next largest

being the Central Northern, and the third largest the Northwestern group.

Massachusetts and Maine have the greatest of lengths of line in the New England group, with 2,105 and 2,091 miles respectively. Pennsylvania and New York have by for the greatest distances of railroad tracks in operation, with 11,161 and 8,212 miles respectively. In the Central Northern group Illinois and Ohio lead with 11,959 and 9,243 miles. Georgia ranks first in length of railroad lines with 6,517 miles, North Carolina coming next with 4,016 miles. In the Gulf and Mississippi Valley group, Alabama is first with 4,759 miles, the next being Louisiana, 3,764. Texas is first in rank as to length of railroads in the Southwestern group, with 11,949 miles, Missouri taking second place with 7,860 miles. The figures for the Northwestern group show that Iowa and Minnesota rank first and second respectively, the former having 9,853 miles of railroad and the latter 7,947 miles. California leads in the Pacific group, with 6,272, Washington being second in rank with 3,301 miles.

Locomotive Engines and Cars.—The number of locomotive engines reported by railroad companies, 1905, was 49,616. The aggregate of passenger cars reported was 30,777; baggage, mail, and other cars, 10,552; freight cars, 1,757, 105.

Capital Stock, etc.—The capital stock of railroads in the United States, 1905, was $6,741,956,825; funded debt, including real estate mortgages, equipment trust obligations, etc., $7,821,243,106; floating debt, $201,978,773. Thus the total liabilities, except current accounts and sinking funds, aggregated $14,765,178,704. The total cost of construction per mile is given as $69,443.

Traffic Earnings.—The gross amount earned from passenger traffic, 1905, was $486,420,902; from freight, $1,478,167,246; miscellaneous earnings, $147,609,622; total gross receipts, $2,112,197,770. The percentage of gross traffic earnings to total liabilities was 14.3; net traffic earnings, $685,464,488.

Interest and Dividends.—The total interest paid by railroads on bonds, etc., 1905, was $291,829,016; dividends paid, $216,067,938; interest per cent. of bonds and debt, 3.64; dividends per cent. of stock, 3.27; gross earnings per mile of railroad in operation, $9,643; net earnings per mile, $3,135; percentage of expenses to earnings, 67.49.

Passengers and Freight Carried.—The number of passengers carried on the railroads of the United States, 1905, was 745,446,641; passengers carried one mile, 23,906,420,668; average receipts per passenger per mile, 2.03 cents. Freight carried, 1,435,321,748; total freight carried one mile, 187,375,621,537; average receipts per ton per mile, .78 cents.

Accidents.—The report of the Interstate Commerce Commission shows that 3,361 employees, 537 passengers, and 5,805 other persons were killed in railroad accidents

during 1905; employees injured, 66,833; passengers injured, 10,457; other persons injured, 8,718.

Receiverships and Foreclosures.—Six railroads, with a total mileage of 204, were placed in the hands of receivers in 1906. The stocks and bonds of these roads were valued at $55,042,000. The number of roads sold under foreclosure, 1906, was eight, having 262 miles of tracks. The stocks and bonds of these latter companies were valued at $10,400,000.

Street and Elevated Railroads.—The total number of surface and elevated railways in the United States, 1906, was 916. The mileage aggregated 14,470, of which 12,133 miles were electric in their equipment. The aggregate number of cars reported was 48,182. The capital stock invested in street and elevated railways of the United States, 1906, was $784,813,781; funded debt, $590,596,391.

Shipping, Sailing and Steam Vessels.—The number of American sailing vessels, 1906, including canal boats and barges, was 15,506, with a tonnage of 2,699,682; number of steam vessels, 9,500, with a tonnage of 3,975,287. The total tonnage of American vessels engaged in foreign trade, 1906, was 928,466, of which 586,749 were credited to steam vessels. The total tonnage of American vessels engaged in coastwise trade was 5,674,044; in the whale fisheries, 11,020; cod and mackerel fisheries, 61,439; total tonnage of all American vessels employed in foreign and coastwise trade and in fishery operations was 6,674,969.

Construction of Vessels.—The number of sailing vessels built in the United States, 1906, was 229, with a gross tonnage of 35,209; steam vessels, 650, with a gross tonnage of 315,797; canal boats, 83, with a gross tonnage of 8,832; barges, 259, with a gross tonnage of 58,997.

Value of Imports and Exports Brought to the United States in American Vessels.—The value of imports brought in American vessels, 1906, was $168,488,129, or 14.8 per cent. of all imports. The total of exports taken from the United States in American vessels during the same period was $153,859,076, or 9.9 per cent. of all exports.

Lake Transportation.—The number of American vessels arriving during 1906 at American ports in connection with the domestic lake trade was 80,829, with a tonnage of (net) 94,528,194; clearances, 1906, 81,271, with a tonnage of (net) 94,893,961. The number of leading ports used by these vessels was 60. Many minor shipping places were also utilized.

Canals.—There are 40 canals in the United States, the longest being the Erie, 387 miles; the Ohio canal, 317 miles; the Miami and Erie, 274 miles, and the Pennsylvania canal, 193 miles. The next in order of length are the Chesapeake and Ohio and several railroad canals, operated by railroad and navigation companies. The Pan-

ama canal, now in progress, will, when completed, hold a most conspicuous position among the world's artificial waterways.

Most prominent of all transportation methods in the United States today are those of railroads and steam navigation.

AGRICULTURE, HORTICULTURE AND FORESTRY.

The principal agricultural section of the United States is enclosed in the vast area represented in the valleys of the Mississippi, Ohio, and Missouri rivers and the Gulf plains. The most extensive and most productive wheat and corn fields in the world are in the northern part of this area. From Ohio to Nebraska, a territory occupying a central position in the section, corn, cattle, and hogs are the chief products, with great meat-dressing and packing facilities. Cotton is raised in the Gulf plain district. The extreme south, including Louisiana, yields sugar in large quantities. The raising of cattle and sheep is extensively carried on along the great plains. The proportion of the aggregate land area of the United States under cultivation is about one-sixth, but of the remainder it is calculated that two-sixths is worked.

Corn is the principal cereal, then come in their order, wheat, oats, and hay. Other important agricultural products are sugar, rice, tobacco, cotton, flax, fruits, and vegetables. The chief animal products are cattle, sheep, horses, hogs, and poultry. In 1900, the latest available figures, the total number of farms was 5,739,657, with 841,201,546 acres, 426,408,355 acres being unimproved. The value of all farm property, 1900, was reported as $20,514,001,838, of which $16,674,690,247 was in land with improvements, including buildings; $761,261,550, implements and machinery, and $3,078,050,041, live stock.

The corn crop of 1906 yielded 2,927,416,091 bushels. The crop of wheat was 735,260,970 bushels; oats, 964,-904,522 bushels; rye, 33,374,833 bushels; barley, 178,-916,484 bushels; buckwheat, 14,641,937 bushels. The cotton crop, 1905, was 10,804,586 bales; tobacco, 682,428,-530 pounds; hay, 1906, 57,145,959 tons; potatoes, 308,-038,382 barrels; flaxseed, 28,477,753 bushels; washed and unwashed wool, 298,915,130 pounds; wool, scoured, 129,-410,942 pounds.

Percentage of Products vs. World Comparison.—Wheat.—The United States produces over 20 per cent of the world's wheat product, Russia and France following in quantity with 15 per cent and 12 per cent. Kansas, 1906, led in state wheat product with 82,000,000 bushels. North Dakota holding second place with 78,000,000 bushels and Minnesota third with 56,000,000 bushels.

Indian Corn.—The produce of Indian corn or maize in the United States equals 75 per cent of the world's output. The remainder, practically, is raised in Mexico and southern Europe.

Oats.—The United States occupies second place in product of oats, with 25 per cent, Russia's output being a trifle more. Germany comes third with 18 per cent.

Cotton.—The United States yields 75 per cent of the world's cotton product, India and Egypt coming next with 12 per cent and 10 per cent respectively. Texas stands first among the states in cotton product with, in 1905, 2,600,000 bales, with Georgia, Alabama, and Mississippi next.

Tobacco.—Nearly 40 per cent of the world's tobacco product is credited to the United States. India ranks second with 32 per cent. Kentucky leads in state product, 1906, with 252,000,000 pounds. The next largest state products are Ohio, 74,000,000 pounds, and Virginia, 73,500,000 pounds.

Horticulture.—Apples are most plentiful in the northeast. There is usually a large and widespread crop of strawberries. Delaware, Maryland, and New York are famous for the quality and quantity of peaches produced. Oranges, lemons, and pineapples are specialized in Florida. The grape crop of New York is usually very large. California olives are much in demand.

Forestry.—There are, approximately, in the United States 500,000,000 acres of forest land. The inroad made annually on the timber on this land, or that part of it where lumbering is carried on, amounts to about 25,000,000,000 feet. The lumber regions are divided into five sections, geographically. Michigan, Wisconsin, and Minnesota, forming the lake region, yield large quantities of white pine and spruce. Yellow pine is found in the south part of the southern region. In the northern part of that region hardwood predominates; in the lower Mississippi Valley and in the tidewater region of North Carolina and Virginia, also embraced in the region, the cypress is largely found. Maine, embraced with the New England and North Atlantic states in the northeast region, yields much maple, hemlock, spruce, birch, and white pine. The Middle Atlantic states, in this region, are prolific in oak, pine, and hickory. Yellow pine and spruce are found abundantly in the Rocky Mountain region. The densest forests in the United States are in the Pacific region, which yields, to the northward, Sitka spruce and red fir. In California is much yellow pine and redwood.

Agricultural Education.—Since 1887 every state and territory has received an appropriation of $15,000 per annum from the Federal government for the purpose of agricultural instruction and experiment. Every state and territory is now using this appropriation, together with a state or territory appropriation, to good purpose. Colleges and experiment stations are general throughout the country and are doing almost incalculable good in strengthening the interest of young men in agricultural pursuits. Many of these institutions are equipped with the latest and most costly instruments for scientific work

along all agricultural lines and retain continually a staff of specialists representing every branch of the agriculture, horticulture, and forestry science.

MANUFACTURES.

Manufacturing industries, for purposes of classification and logical statement, are officially designated and described as belonging to four great divisions: products of the farm, of the mine, of the forest, and of the sea. The record of the Federal census of manufactures, 1905, shows, in this department, a gross value of product and in number of wage-earners ranking in the order named above.

Present Conditions and Increases since 1900.—The census report shows, 1905, the following conditions:

Number of Establishments	216,000
Capital Invested	$127,000,000,000
Officials and Clerks, etc	520,000
Officials and Clerks' Salaries	575,000,000
Number of Wage Earners (average)	5,500,000
Total Wages Paid	$2,600,000,000
Cost of Material Used	$8,500,000,000
Value of Product, including customs	$14,900,000,000

The increases in each class mentioned above, 1905 over 1900, is thus reported: Increase in number of establishments, 4.2 per cent; increase in capital invested, 41.3 per cent; increase in number of officers and clerks, 42.7 per cent; increase in salaries officers and clerks, 50.9 per cent; increase in number of wage-earners, 16 per cent; increase in amount of wages, 29.9 per cent; increase in cost of material used, 29.3 per cent; increase in value of products, 29.7 per cent.

Much interesting data regarding the development since 1900 and present status of the manufactures is given in the summary of the director of census. Among the most important comparisons as to rank in value of products, etc., are the following, the figures given being added from the official tabular exhibit:

Highest Values and Greatest Increases.—Slaughtering and meat packing stand first among United States manufactures in value with $802,000,000. The number of wage-earners in this industry, however, 74,000, is much less than in the lumber and timber producing industries, employing over 400,000 men. Flour and grist mill products stand first in absolute increase in value of products since 1900, i.e., $212,000,000. The car and general shop construction and repairs department of steam railroad construction show the greatest increase in number of wage-earners, 63,000.

Averages.—The statistics for the manufacturing industries of the country as reported for the census of 1905, when compared with the totals for the census of 1900, indicate an increase almost as great as that of the census of 1900 over that of 1890. The average number of wage-earners employed during the year reported for the

census of 1905 exceeds the number reported for 1900 by 755,298, or 16 per cent. The amount of wages exceeds that of the former census by $601,804,733, or 29.9 per cent, and the value of the products by $3,391,025,965, or 29.7 per cent. The motive power employed in manufactures increased from 10,409,625 horsepower in 1900 to 14,464,940 horsepower in 1905, a gain of 4,055,315 horsepower, or 39 per cent, as compared with an increase of 4,454,970 horsepower, or 74.8 per cent, for the preceding decade. The comparatively small increase in the number of establishments is due in part to the impossibility of reducing the number reported in 1900 to a strictly comparable basis with 1905. In 1905 the average establishment, as computed from the total for all industries in the entire country, employed 25 wage-earners and had an annual product valued at $68,445.

Leading States.—New York, Pennsylvania, Illinois, and Massachusetts, in the order named, are the four leading manufacturing states. They contained 86,333, or 39.9 per cent, of the establishments for the entire country; gave employment to 2,488,064, or 45.5 per cent, of the average number of wage-earners; and reported $6,978,331,091, or 47.1 per cent, of the value of products.

The states east of the Mississippi river and north of the Mason and Dixon line and the Ohio river contained 65.5 per cent of the establishments in the United States, gave employment to 74.1 per cent of the number of wage-earners, and reported 73.0 per cent of the total value of products.

Capital.—The $12,686,265,673 reported as capital is the total amount of capital at the end of the business year, both owned and borrowed, including land, buildings, machinery, tools, and implements, cash on hand, bills receivable, and unsettled ledger accounts, raw materials, stock in process of manufacture, finished products on hand, and other sundries. Incorporated companies were requested to report these values as distinct from their capitalization. The amount does not include the value of rented land, buildings, or machinery. The amount, $73,267,209, reported under miscellaneous expenses as rent of factory or works, does not include the rent of offices. If this gross rent were capitalized at 8 per cent, it would represent $915,840,113 as the value of rented property, which, added to the value of the capital owned and borrowed, gives an aggregate of $13,602,105,786.

Season Variations.—Of the principal industries the greatest variation in employment at different seasons of the year is shown for the canning of vegetables and fruits, in which the average number of wage-earners for September was 61,916, and for February, 6,112. The least variation is shown for the tanning and currying of leather, the highest average, 57,718, being for March, and the lowest, 56,121, for January.

Women Workers.—Women wage-earners were reported

for 316 of the 339 industries. The average number increased from 918,511 in 1900 to 1,065,884 at the census of 1905, or 16 per cent. The greatest increase is shown for the manufacture of tobacco, cigars, and cigarettes. The state of New York ranks first also in the employment of women, the greatest number being engaged in the manufacture of women's clothing. Of the 10 industries reporting the greatest number of women, the proportion to the total number of wage-earners in the industry is largest in the manufacture of shirts.

Child Workers.—Children were reported for 315 of the industries. The average number decreased from 161,276 in 1900 to 159,899 at the census of 1905, or less than 1 per cent. The greatest decrease is shown for printing and publishing, newspapers and periodicals. A decrease in the employment of children is shown for 25 states and territories and an increase for 26. The greatest average number was employed in the manufacture of cotton goods, during the month of December. The month in which the greatest average number of children were employed in all branches of manufactures was September. Pennsylvania ranks first and Massachusetts second in the number of children employed. The greatest numbers in both of these states are shown for the textile industries.

Exports and Imports of Manufacture, 1908.—The exports of iron and steel manufactures, 1908, are officially reported as having a value of $184,000,000; imports, $28,000,000. The value of domestic exports of cotton manufactures was $25,000,000; imports, $68,000,000. The imports of wool manufactures were valued at $20,000,000; imports of raw wool, in quantity, reached 126,000,000 pounds,. The value of silk manufactures imported was $33,000,000; unmanufactured silk, $65,000,000. The sugar import was, in weight, 3,375,000,000 pounds, valued at $80,000,000. Because of its bearing on domestic manufactures, it may be noted that the exports of domestic cotton, 1908, reached 3,800,000,000 pounds, valued at $438,000,000. The imports of raw cotton, 1908, amounted to 71,000,000 pounds, valued at $14,000,000 The tin import, 1908, was 78,000,000 pounds.

FINANCE AND TARIFF.

The history of the finances of the United States is so clearly connected with the tariff that the history of the one is practically the history of the other. Anyway, it is impossible to separate them in any brief resumé. In 1789 the finances were in a deplorable condition, due to the burden of debt from the Revolutionary war, and the failure of the tariff of Confederation days to yield even an approximation to an adequate revenue to meet the expenses of the central government. The new administration had to assume a debt of more than $54,000,000, and the individual states owed in the aggregate upwards of

$20,000,000, a tremendous burden for 4,000,000 people and an undeveloped country. In 1790 Congress voted a complex and ingenious funding scheme, which provided for the payment of the debts due to foreigners, amounting to about $12,000,000; the taking up of previous obligations, and the payment of about one-third of the state indebtedness which had been incurred for war purposes. The various objections were met by a firm determination to preserve the credit of the national government at all hazards, and by establishing the seat of the national government in southern territory, thus soothing those states of the south that were debt-free, who had been threatening not to pay anything towards the extinction of the debts of other states who had been careless or indifferent. In 1895, at the close of the funding operations, the public debt was $84,700,000, and the interest account about $3,000,000 yearly.

The very first tariff, that of 1789, while devised primarily for revenue, was nevertheless drawn on lines of protection for home industries, as is proved by a reading of the debates attending the adoption of the bill in Congress.

In the law establishing a treasury department, provision was made for a secretary of the treasury, a cabinet position; for a comptroller to pass on the legality of bills presented against the government; for an auditor responsible for the accuracy of the accounts; for a register to preserve the accounts; and for a treasurer to receive and pay out money on presentation of proper warrants. The framework of this system has continued until the present time and has proved highly effective in safeguarding the government against illegal expenditures. Alexander Hamilton was chosen secretary of the treasury, and by his constructive genius, exhibited in a remarkable series of reports on public credit, a mint, national bank, and manufactures, encouraged Congress to establish its credit on a broad and generous basis. Through his influence the Bank of the United States was established, which granted temporary loans to the government, furnished a sound note circulation, and took care of the government funds. In 1791 it was found that additional revenue was needed, and under the advice of Hamilton internal revenue duties were imposed upon the distillation of spirits. This provoked opposition, especially in the agricultural section of the Middle and Southern states. Here it was claimed that the interior was sacrificed to the commercial interests of the northern seaboard. In 1794 there was open defiance in Pennsylvania, and the federal troops were called out to put down the so-called Whiskey Insurrection. In 1794 excise duties were extended to carriages, sales of liquors, manufacture of snuff, refining of sugar, and auction sales. The constitutionality of the carriage tax was assailed on the ground that it was a direct tax and should be levied by apportionment according to population. The Supreme

Court, however, in the case of U. S. *v.* Hylton (1796), decided that under the Constitution there were practically but two direct taxes, the poll tax and the tax on land, that the carriage tax was an indirect tax and consequently constitutional. Expenditures continued to exceed the earlier estimates; the Indian war of 1790 was followed by the Whiskey Insurrection, and in 1797 new military and naval expenditures were demanded on account of the strained relations with France. In 1798 a direct tax of $2,000,000 was laid upon dwelling houses, lands, and slaves. In 1800 the total receipts from all sources was $10,848,000, of which $9,081,000 was derived from customs and $1,543,000 from internal revenue and the direct tax.

Hamilton resigned from office in 1794 and was succeeded by Oliver Wolcott, who maintained the federalist policy of his predecessor. The administration of each was subjected to severe and bitter criticism by the Republican party under the leadership of Albert Gallatin. Charges were made that the accounts were juggled, that adequate information of the condition of the treasury was not given to Congress, and that appropriations were not made for specific objects but in lump sums, giving undue and arbitrary power to the treasury department. In 1801 the Republicans came into power with Albert Gallatin as secretary of the treasury, and the internal taxes were abolished, but so great was the business of the country that in spite of a new loan of $11,250,000 to pay for the Louisiana Purchase, the debt in 1812 was reduced to $45,000,000 from $86,000,000, in 1804. This prosperity was temporarily checked by the embargo act, and the money in that section. The failure to renew the charter of the United States Bank in 1811 also deprived the government of a substantial agency for making temporary loans or selling securities. Moreover, there were intrigues in the Republican party directed against Gallatin; his influence was so far weakened that in May, 1813, he retired from the treasury.

Gallatin's successors in the treasurership were men who were not capable of coping with the difficulties occasioned by the outbreak of the war of 1812, and congress was slow in providing revenues. Specie payments were suspended, commerce was almost at a standstill, and internal taxes with loans were the only resources. Deficit followed deficit, and so poorly were all financial affairs managed, it is estimated that for obligations of upwards $80,000,000, the government received about $34,000,000, reckoned on a specie basis. Even so able a man as Alex. J. Dallas, who became secy. of treasury in latter part of 1814, could not extricate the treasury from the troubles caused by depreciated currency, and insufficient revenue.

Under the circumstances there was no strenuous opposition to the re-establishment of the U. S. bank, which was given a new charter in 1816, that was to run for 20 years. Its capital was based in large part on government

stock, and the government had representatives on the board of directors. It was provided, in effect, that all the currency of the country, except specie and treasury notes, should be redeemable in notes of the new bank. This decisive action obliged the state banks to adopt sounder methods, and after 1817, Feb. 20, there was a general return to a specie basis.

A reorganization of the revenue system followed, to meet the conditions occasioned by the rush of imports and the revival of business that took place at the close of the war. On the plea that this enormous inrush of foreign commodities put in peril the capital which had been put into manufacturies during the war period, the tariff bill of 1817 was confessedly a measure of protection, even the south joining in its support.

The era of prosperity that followed the end of the war was abruptly ended by the mismanagement of the affairs of the U. S. bank; the currency was thrown into confusion, and a most calamitous panic and period of business depression begun in 1819. The government reduced expenses in every direction, trade dwindled, and it was not until 1822 that the revenues covered the expenses. In 1820 an attempt was made to increase the tariff rates, but the south was again back to its free trade, or at least 'tariff for revenue only,' position, and it was not until 1824 that a tariff bill got through, in spite of the almost unanimous opposition of the southern states vote. For the next 10 years the tariff occupied a large place in the politics of the day, until the question of slavery and other issues took its place.

The tariff of 1824 fell short of the demand of woolen manufacturers, and agitation for a revision with still higher rates resulted in the tariff of 1828. New England was turning more and more to protection, and Webster under instructions made a speech declaring that through the encouragement of the act of 1824 capital had been invested which needed further protection. The woolen tariff, or tariff of abominations, as the measure was frequently termed, aroused the fiercest controversy, which finally led to nullification and the compromise tariff of 1833. By this latter act a horizontal reduction of duties, spreading over a number of years, was made and for a while the tariff question yielded in importance to other political issues.

President Jackson's attacks upon the U. S. bank and his drastic action in removing the public moneys and depositing them in certain state banks, did not upset business to the extent that might have been expected, because of the enormous increase of revenue from all sources, from 1830 on. In 1835 the public debt was paid off, and to the accumulating custom revenues was added the money from the sale of public lands. The fiscal problem now became the handling of a surplus, and the financiers of the day were as unsuccessful in this as

they had been with a deficit, so far as the establishment of a definite and consistent policy was concerned. The upshot was the depositing of the surplus with the various states, nominally as a loan without interest, but practically as a gift from the treasury of the United States to the treasuries of the several states. The money was to be paid in from quarterly installments during the year 1837, but before the last installment could be paid the surplus had vanished through the workings of the 'Specie Circular.' This was an order from the treasury to all land agents to accept specie only in payment for the public lands sold; as local bank notes had been previously received, and specie was scarce in the west, where sales were made. Speculative operations based upon land were sharply checked. Eastern banking institutions with western connections were obliged to contract their loans, and this, coupled with a heavy transfer of funds, in accordance with the deposit act, proved a severer strain than many banks could stand. The evils were aggravated by commercial failures in Europe, decreasing crops, and southern speculation in cotton. In 1837, May, the banks throughout the country suspended specie payments, and as the treasury had parted with its funds, it shared in the distress and was also forced to suspend. During the next few years treasury notes were issued amounting to $47,000,000, of which one-third was reissues; and between 1841 and 1843 there were three long-term loans. With the exception of 1839, there was a series of annual deficits until 1844. The administration of President Van Buren tried to establish an independent treasury, but as it was not fairly started when abolished by the whigs, and until 1846, the public money was deposited in local banks.

In 1846 the democrats regained the presidency and at once re-established the independent treasury system and enacted a new tariff. The treasury act of 1846 provided for the custody of public funds at mints, custom houses, and at sub-treasuries in a few of the larger cities. It also provided that all public dues should be made either in specie or treasury notes, thus excluding bank notes. The system in its main features has remained unchanged to the present time, and it has been successful in safeguarding the funds of the government.

The tariff of 1846 was a free trade tariff; specific duties were abolished; and the duties were so rated as to yield the largest amount of revenue. Commercial enterprise was again at a high level; railroad construction and foreign immigration contributed to new industrial development; and in spite of the temporary interruption occasioned by the war with Mexico, the treasury entered upon another long period of prosperity. Customs receipts were large; the sales from public lands again proved fruitful; and repeated surpluses made it possible to reduce the debt, until in 1857 it stood at $28,800,000.

In 1857 another reduction in tariff rates was made to which all sections of the country gave generous support. Railroad construction, however, had been carried too far and capital for the moment was unprofitably tied up in unproductive investment. Bank note circulation was unduly expanded, and a panic occurred in 1857, Aug. The treasury with weakened resources fell into embarrassment and was obliged to issue treasury notes to meet its obligations. In the years 1858-60, the deficits amounted to $50,000,000.

During the period of 1816-61, the United States became a commercial nation, necessitating new methods of customs administration. The regulations affecting the appraisement of goods were made more strict. Credits to importers were abolished, and in its place a system of warehousing was established. Among the later secretaries of the treasury, Walker and Guthrie stand out pre-eminent, the first for his notable report in which he recommended the tariff of 1846, and the second for his development of administrative details.

In the winter of 1860-1 the finances of the federal government were most discouraging. Secession was already under way; national credit was depressed; and executive efficiency was slowly disintegrating. There was little confidence that the republican party, which had carried the election in 1860, Nov., would be able to weather the approaching storm. Some strength was shown at the close of the session by the passage of a new tariff law known as the Morrill tariff, in which rates were slightly advanced. Lincoln took office 1861, Mch. 4, and appointed Salmon P. Chase secretary of the treasury. On Apr. 15 the troops were called out to put down the rebellion, and the country entered upon a four years' war which tried the financial system to the utmost, necessitated radical methods of financiering, burdened the country with an enormous debt, and raised taxes to a permanently high level. In brief, during the fiscal years, 1862-5, expenditures were $3,348,000,000; taxes $667,000,000, and loans $2,622,000,000. Loans were nearly four times as large as taxes. In the spring of 1861 it was not supposed that the war would last long, and consequently the legislation of July and August was not designed to increase taxes in any considerable degree. A loan of $250,000,000 was authorized, some increase was made in the tariff schedules, and an income tax was levied. Under the authority of the loan act the treasury department endeavored with the assistance of local banks to borrow $150,000,000 by the issue of three year treasury notes, bearing 7.3 per cent interest, since known as the seven-thirties. The banks responded with energy, but owing to the restrictions of the independent treasury law requiring all payments to the government to be made in specie, they could not carry the burden, and in December suspended specie payments. The treasury department was

forced to follow their example. By the act of 1862, Feb. 25, a comprehensive loan act was passed, and authority given for the issue of $150,000,000 non-interest legal tender treasury notes. There was much opposition to making the notes legal tender, but the issue was justified in the debates on the ground of necessity,—'necessity to meet the immediate obligations of the government; necessity to give currency to treasury notes; necessary to provide money which would in turn purchase bonds.' Two further issues, each of $150,000,000, were made by the acts of 1862, July 11, and 1863, Jan. 17. In addition to these non-interest notes, the legal tender quality was attached to some of the other short-term treasury notes. Other forms of treasury indebtedness were demand notes, certificates of indebtedness, temporary loans and fractional currency. Of the total amount borrowed, $1,045,000,000 was in the form of long-term loans; $890,000,000 in interest bearing notes; $458,000,000 in non-interest bearing note, and $208,000,000 in temporary loans.

In 1862, July, internal revenue taxes were imposed to an extraordinary degree, but even this almost universal taxation did not meet expectations and in 1864 the system was wellnigh universal in its application.

'Nothing was omitted from the raw product to the finished commodity; often an article received a half dozen additions ere it reached the consumer. And not only were all the constituent elements which entered into an article taxed, as the bolts, rivets, castings, trimmings and the like of an engine, but the engine when completed was subjected to an additional ad valorem duty upon its value.' Customs duties were again advanced because of the increased duties upon manufactures. The act of 1864, however, went further in the direction of protection and brought rates up to a level which established a new standard of protectionism. The average rate on dutiable articles was increased to 47 per cent. The income tax of the war period was highly productive; at its maximum, incomes between $600 and $5,000 were taxed 5 per cent; and incomes above $5,000, 10 per cent. The total receipts from this source, 1863-73, amounted to $347,000,000.

When the legal tender notes were first issued they were convertible into bonds,—securities which had a definite gold value, as interest was payable in gold. The quality of convertibility was taken away by the act of 1863, Mch. 3, and this, together with the increased issues and the waning hope that the government would be able within any short period of time to settle its obligations on a gold basis led to a marked depreciation in the value of greenbacks. In 1864, July and August, the average value of the gold dollar in currency was but 39 cents. As gold was daily needed by importers to pay customs duties and to settle balances abroad, a brisk and often speculative market in bullion resulted. Moreover, the repeated fluc-

uations in the value of gold measured in currency, occasioned by alternating hopes and fears as to the outcome of the war, affected all business. Prices were abnormally high, and it was estimated that the cost of the war to the treasury alone was increased by the inflated issues about $600,000,000.

When peace was restored in 1865, there were three enormous tasks before the government: funding the debt into more convenient form, revision of the tariff system, and the restoration of a standard of value by the resumption of specie payment. In 1865, Sept. 1, the public debt was $2,846,000,000; less than one half of this was funded; loans bore interest at five different rates; they matured at 19 different periods; and some were convertible or redeemable at the option of the government. At first there was apparently general agreement that the volume of legal tender notes should be reduced, for in 1865, Dec. 18, the house of representatives passed a resolution in favor of a contraction of the currency with a view to as early a resumption of specie payments as the various interests of the country would permit. The funding act of 1866, Apr. 12, authorized the conversion of temporary short-time interest bearing securities into long-term bonds, but provided only a slight contraction of legal tender notes. It gave authority to retire $10,000,000 within six months and not more than $4,000,000 in any one month thereafter. Even this reduction was not long continued. It was not easy for the country to readjust itself to peace conditions. Discontent was especially strong in agricultural sections where indebtedness had been incurred by farmers on long-term credits. The return of hundreds of thousands of soldiers to industry led to many ill-advised ventures and failures. Prices naturally fell with the withdrawal of the excessive demands made by war, and for this fall producers were disposed to place the blame upon the contraction in currency. In 1868, Feb. 4, after $44,000,000 in greenbacks had been retired, further contraction was suspended. In 1869 the supreme court in the case of Hepburn vs. Griswold decided, four to three, that the legal tender notes were unconstitutional. In 1871 the decision was reversed on the ground that the government had the right to employ freely every means, not prohibited, which was necessary for its promotion. In 1884 the court decided in favor of the constitutionality of issues in times of peace.

National credit was also assailed by the proposition that federal securities should be subject to local taxation and by the demand that bonds should be redeemed in currency instead of in coin. In some sections bitter attacks were made upon the rich, who were represented as owners of idle wealth which they had gained through the possession of government securities at the expense not only of the laborer who had toiled under low wages and

high prices, but also of the soldier who had taken his life in his hands and had received his pay in greenbacks. In 1870 a refunding act was passed authorizing the issue of $500,000,000 bonds at 5 per cent, redeemable after 10 years; $300,000,000 at 4½ per cent, redeemable after 15 years, and $100,000,000 at 4 per cent, redeemable after 30 years, all to be paid in coin, and exempt from national, as well as local, taxation. This act with supplementary legislation fixed the character of the debt for the next 25 years.

In 1873 there occurred a commercial panic that caused prolonged and widespread depression. Congress sought to relieve the situation by issuing millions of treasury notes, based on the credit of the government, but this inflation was prevented by President Grant's veto. Finally in 1875 it was determined to resume specie payments on Jan. 1, 1879, and the efforts of the government were directed to the accumulation of gold in the treasury, with so much success that specie payments were renewed on the date set.

The financial situation was complicated by the discussion over the demonetization of silver, which was not thought a proper basis for a currency standard because of the immense supplies of the metal that were available and its fall in price. Foreign countries had abandoned its use except as subsidiary coin, and the mines of the western states could find no profitable market for their product. The upshot of the agitation was the passage over President Hayes' veto of the Bland-Allison act, which obliged the treasury to purchase from two to four million ounces monthly at market rates. Although coined, it was impossible to circulate them in any quantity, as the people were accustomed to paper money; but they were finally used as a basis for the issue of silver certificates, which passed current. This law continued until 1890, when it was superseded by the Sherman act, which obliged the purchase of four million ounces monthly, and the issuing of certificates that were full legal tender, and might be redeemed for either gold or silver.

The close of the Civil war allowed the immediate removal of the heaviest of the internal taxes, but the benefits of protection had seemed to be so great it was impossible to make any material changes in tariff rates. The recuperation after the panic of 1873 was rapid once it began, and in 1890 large surpluses began to accumulate, and Congress was forced to overhaul the tax system. A tariff commission recommended a reduction in the customs, but little attention was paid to the suggestions; even the Democrats, who were in control from 1885 to 1889, could do nothing, and when in 1889 the Republicans again gained the ascendency, the McKinley bill developed protection to a point never before reached. This bill introduced two new principles into U. S. finances: reciprocity, and bounties on domestic produc-

tions. Under this tariff customs duties declined, and this, coupled with commercial disturbances, resulted in the exportation of gold. The reserve, which since 1879 had been maintained at $100,000,000, or more, began to slip away, until there was fear that the treasury would be forced on a silver basis. On June 30, 1890, the reserve stood at $190,000; three years later it had fallen to $95,000,000. The significance of the underlying forces which were weakening government credit were not, however, clearly seen, and appropriations continued to be made with a liberal hand. In 1890 there was a surplus of $105,000,000; in 1893 it was but $2,000,000, and in 1894 there was a deficit of $70,000,000.

The Democrats won in the elections of 1892 and Cleveland again became president. In June, 1893, the mints in India were closed to the coinage of silver; this led to a still further fall in the price of silver bullion and occasioned immediate apprehension that the treasury would soon be unable to redeem its obligations in gold. Within a few weeks the country was in a state of panic. President Cleveland called a special session of Congress and after most urgent pressure secured the repeal of the silver purchase act of 1890. The country did not easily recover from the panic; withdrawals of gold from the treasury continued and the administration was forced to make four issues of bonds in order to keep an adequate supply of gold on hand to meet the requirements of the 'endless chain.' The embarrassment of the treasury was also aggravated by an insufficient supply of revenue. The Democrats in 1894 enacted a new tariff measure which included an income tax; as introduced in the House under the leadership of Wilson, this bill was in the interest of free trade, but protective sentiment within the Democratic party radically modified the measure in the Senate, so that in its final form it made little change in existing policy. The income tax was promptly attacked on the ground of unconstitutionality. In a decision of April 8, 1895, the Supreme Court decided that a tax on income from land was a direct tax and therefore unconstitutional unless apportioned; and in a decision May 20 income derived from other sources was also brought within the same interpretation.

The presidential campaign in 1896 was fought out on the basis of free silver. The Democrats in their platform declared in favor of the free and unlimited coinage of gold and silver at the ratio of 16 to 1, without regard to the action of the rest of the world. The Republicans with a declaration for the gold standard won, and in 1900 made this standard secure by authorizing the secretary of the treasury to sell bonds for gold whenever the reserve fell below $100,000,000. The protective tariff system was again put in force under the Dingley act, which remained in force, with minor changes, until the passage of the act of 1909.

The war with Spain necessitated the sale of bonds to the extent of $200,000,000, and the imposition of various internal taxes, which were removed as soon as the war ended.

The total receipts of the government from all sources, except loans, from 1789 until 1908 inclusive, were $20,741,630,749, and the expenditures for the same period amounted to $20,825,050,821.

BANKS AND BANKING.

The First Bank of the United States, chartered by Congress in 1798, with an authorized capital of $10,000,000, was the first public institution of the kind to be established under the auspices of the republic. The act sanctioning this bank granted the privilege of note issue, such notes to be recognized as legal tender, acceptable to the federal authorities and receivable in payment of federal charges and claims.

For financial purposes the First Bank was the representative of the government. Money was frequently advanced by the bank to the Treasury Department to meet deficits. Of the whole capital authorized by the charter, one-fifth was subscribed by the government. The charter was granted for a period of 20 years. The opening up of branches in the several states soon became imperative. At the end of the charter term there were more than 80 'state banks' doing business under the control and direction of the First Bank directors.

In 1811, when application was formally made for charter renewal, Congress declined to approve. Then the state bank idea took firmer root. Impetus was given to it when specie payments were suspended in 1814. Two years after that event the national legislature authorized the chartering of the Second Bank of the United States, fixing the authorized capital at $35,000,000. The government subscribed one-fifth of this amount, as before. This second bank failed to satisfy the banking constituency and the legislators in Congress. President Andrew Jackson antagonized favorable action and the plan fell through.

Organization of National Banks.—The national bank system was created by congress during the Civil war period, in 1863. Banks were chartered under federal authority. They were permitted to deposit United States bonds with the secretary of the treasury. In return for these bonds circulating notes were issued. These notes were rated in value at 90 per cent of market and par rates. An aggregate circulation of $30,000,000 was fixed upon. This plan, which looked promising at the outset, did not give satisfactory results. The statutes underwent another revision during the year following its enactment. The system now in operation has the law of 1864 as its foundation.

Under certain limitations and with certain restrictions

national banks are now required to use part of their capital in the purchase of United States registered bonds. The law of 1864 was amended in 1874 and again in 1875 and 1900. The present condition of the national banks and, for the purpose of comparison, the present condition of the United States, is shown in the following statement:

Gold in the Treasury.—The official report of the secretary of the treasury for the year ending July 1, 1906, gives the amount of gold coin and bullion in the treasury as $247,000,000. This is an increase of $59,000,000 over 1905. The value of gold coin in circulation is reported as being $669,000,000, an increase over 1905 of $16,000,000. The value of gold certificates in circulation is $517,000,000. These figures bring the aggregate value of gold in the treasury and in circulation to $1,432,000,000, this aggregate being $107,000,000 more than was held in 1905.

Silver Dollars and Certificates.—The treasury vaults contain, in round numbers, 6,400,000 standard silver dollars as compared with 20,000,000 held in 1905. There are 77,000,000 standard silver dollars in circulation. The total number in circulation, 1905, was 74,000,000. Silver certificates in circulation now aggregate in value $472,000,000. This brings the grand total of standard silver dollar value, in coin and certificate, to $555,000,000.

Subsidiary Silver Coinage.—The treasury holds nearly $7,000,000 in subsidiary silver coin. There is nearly $112,000,000 of this coinage in circulation. The aggregate of subsidiary silver coin in the treasury and in circulation is, therefore, over $118,000,000.

United States Notes and National Bank Notes.—The treasury contains nearly $11,000,000 in United States notes and over $13,000,000 in national bank notes. There are also in the treasury, issued under the act of July 14, 1890, notes amounting to $49,000. The value of United States notes actually in circulation is $336,000,000; national bank notes in circulation, $548,000,000; treasury notes in circulation, $7,000,000. The aggregate of national bank notes in the treasury and in circulation, it will be noted from the report, exceeds $561,000,000.

Money.—The actual amount of money in the treasury, embracing gold, silver, and currency, is over $333,000,000. The actual amount of coin in circulation is valued at $1,749,000,000; certificates, $98,800,000, giving an aggregate in circulation of $2,737,000,000, or $32.32 per capita. The population taken as a basis for the per capita is 84,662,000.

National Banks.—There are in the United States, according to the latest official statement, 1908, 6,853 national banks, with resources aggregating $9,027,260,000. Of this aggregate, $4,000,000 are credited to loans and $202,000,000 to real estate. These banks have to their credit $628,000,000 of bonds for circulation; other United States bonds, $148,000,000; due from banks,

$491,000,000; specie, $680,000,000; legal tender notes, $188,000,000; national bank notes outstanding (Sep. 1, 1908), $613,726,000; clearing-house exchanges, $276,000,000; due from United States treasury, $6,169,000.

Liabilities.—The liabilities of national banks are reported as follows: Capital stock, $921,000,000; surplus fund, $565,000,000; individed profit, $202,000,000; circulation, $613,000,000; due to depositors, $5,548,000,000; due to banks, $1,900,000,000.

INSURANCE.

Life Insurance.—The purpose of life insurance is to provide a capital sum as compensation against loss by premature death, in return for the payment of a premium. This form of protection had its origin in the insurance of cargoes sent by merchants from port to port in various countries and beyond the seas. There was danger of capture by pirates and other sea marauders of cargoes and crews also. The life insurance plans of today have developed from the simple protective measures thus used to insure, as far as possible, the delivery to consignees of goods ordered by them.

Number of Policies and Amount of Insurance in Force.—The latest reports show that at the end of 1905 there were 5,621,417 ordinary life insurance policies in force. These policies represented an aggregate value of $11,054,255,524; there were also 16,872,583 industrial policies in force. These had an aggregate value of $2,309,754,235. Thus the total number of life insurance policies, ordinary and industrial, 1905, was 22,494,000, with a value of $13,364,009,759.

Income, Payments, Assets, etc.—The total income of life insurance companies, ordinary and industrial, 1905, was $642,058,530. The amount of payment to policy holders during the same year was $264,968,883. The assets of all life insurance companies aggregated $2,706,186,867; their liabilities amounted to $2,372,573,020. The surplus reported from all life insurance companies aggregated $333,613,847.

Fire and Marine Insurance.—Fire insurance represents an indemnity contract. The company accepting the insurance charges certain premium and in return undertakes to compensate up to a certain stipulated sum for any loss or damage through fire to the property mentioned in the policy. It is provided, in such policies, that the claim for compensation must not exceed the actual loss. Under this provision adjusters are employed to judge on claims and assess damages. Unless otherwise specified, fire insurance companies in the United States, persons and firms insuring, must be co-insurers to the extent of 20 per cent of the value of their property. Thus the actual insurance is 80 per cent of property value. As a rule, fire insurance is limited to $5,000 in

any one risk. Larger requirements must be divided into several policies.

Companies issuing marine insurance undertake in their policies to indemnify the holders against the loss of ships, goods, anticipated profits, or any other insurable interest incident to navigation points.

Present Number and Condition of Companies.—The official reports on fire and marine insurance show that, at the end of 1905, there were 575 companies, with a total income exceeding $300,000,000. They paid, during the year, $125,074,600 in losses; their dividends to policy holders amounted to $14,379,174. This brings the total amount of payments to policy holders up to $139,453,774. The above figures refer to the transactions of stock and mutual companies only.

The report concerning Lloyd's and interinsurance associations shows that there are 37 of such associations, with a total income, for 1905, of $3,337,939; losses paid, $1,371,417.

Miscellaneous Stock Companies.—There were, 1905, 95 casualty and miscellaneous insurance stock companies, with a total income of $63,190,680. The payments to policy holders reached $21,646,844.

Accident Insurance.—This form of insurance secures persons holding a policy against pecuniary loss arising out of total or partial disability. Accident insurance is specially classified. In the first class are professional men and others not especially liable to accident. The second class includes master tradesmen; in the third class are mechanics not engaged in hazardous work. The fourth class is for those who are engaged in hazardous work, and the fifth class is that for persons outside of the classes above detailed.

Other forms of insurance are known as surety bond insurance, liability insurance and casualty insurance. Surety bond insurance includes fidelity insurance to secure the integrity of employees, also judicial bonds. Liability insurance insures one person against the liability of damages to a second person. Casualty insurance is held by owners of buildings, factories, etc., to protect them against injuries done to employees or to the general public..

EDUCATION.

Under the general head EDUCATION (q.v.) an extended account is given of the history and systems of education that prevail in the United States. Although the results from these activities have in the past been reasonably successful and satisfactory, a feeling is gaining ground that the education given the young is not quite which it should be to fit the youth of the country for facing and solving the problems of business and private life; that there has been too many 'fads,' too much 'ology,' and not enough of thorough grounding in the essentials, and, at the end of the first decade of the 20th century,

the indications are that a very material change is imminent. Wherever feasible the children of the rural districts are gathered into one central school, where proper grading is possible; in the schools of secondary grade more attention is given it—thoroughness in a few subjects, rather than superficiality in many—and the training of the eye and hand is demanding more and more attention. The aim seems to be to make every grade more practical, and to fit the pupils to do something when their tutelage ends. The promise is that manual training and farm schools, or at least instruction in the fundamentals of handicraft and agriculture, will become important parts of the future system of education in the United States to even a greater extent than in Europe. See COLLEGES IN UNITED STATES; CHILD STUDY; EDUCATION IN UNITED STATES; KINDERGARTEN; NATURE STUDY; PHYSICAL TRAINING; PARISH SCHOOLS; SCHOOL GARDENS; TEACHING, ART OF; etc.

LITERATURE.

The subject of literature in the United States will be found under the title AMERICAN LITERATURE; also PERIODICAL LITERATURE.

RELIGION.

Denominations.—The principal religious denominations in the United States, in their alphabetical order, include the Adventists, of which there are six sects; the Baptists, embracing 13 sects; Catholics, of which there are 8 divisions; Congregationalists; Friends; Jews, including 'Orthodox' and 'Reformed' Hebrews; Lutherans; Methodists; Presbyterians; Protestant Episcopal; United Brethren; and Unitarians. There are 5 general bodies of Lutherans, and 18 independent synods. The Methodist Church, in the United States, comprises 17 divisions. The Presbyterian Church is represented in 12 divisions or associations.

Among the minor denominations are the River Brethren, the Plymouth Brethren, the Catholic Apostolic Church, the Christadelphians, the Christian Catholic Church, Christian Scientists, the Church of God (Winnebrennarian), Church of the New Jerusalem, six communistic societies (Shakers, Amana, Harmony, Altruists, Church Triumphant, and Christian Commonwealth), Disciples of Christ, Dunkards (4 sects), German Evangelical Protestant, German Evangelical Synod, Latter Day Saints, Swedish Evangelical, Mission Covenant, Mennonites (12 sects), Moravians, Salvation Army, Society for Ethical Culture, Spiritualists, the Theosophical Society, the United Brethren, and the Universalists.

Ministers.—The ministry is most largely represented, in the matter of actual numbers, by the Methodists, with over 40,000 clergymen. Next in number of ministers are the Baptists, with over 36,000 pastors. Next to these

denominations come the priesthood of the Catholic Church, with over 14,000 priests; the Presbyterian Church, with more than 13,000 ministers, and the Protestant Episcopal Church, with more than 5,000 ministers. The grand total of ministers of all denominations in the United States exceeds 150,000.

Churches.—The Methodists lead in number of churches and chapels, that denomination having nearly 60,000 edifices. The Baptists stand second on the list, with more than 52,000 churches and chapels; then follow the Presbyterians, with 16,000; the Lutherans, with 13,000; the Catholics, with over 12,000; and the Protestant Episcopal Church, with over 7,000. The total number of church edifices in the United States exceeds 200,000.

Communicants.—The Catholic denominations have the largest aggregate of communicants, the total number being more than 10,000,000. Other denominations having more than 1,000,000 communicants include the Methodists, over 6,000,000; Baptists, over 5,000,000; Lutherans and Presbyterians, nearly 2,000,000 each. The total number of communicants of all denominations in the United States exceeds 30,000,000. This represents actual church membership.

Sunday Schools.—There are more than 142,000 Sunday schools in the United States. These institutions are under the control and supervision of 1,500,000 superintendents and teachers. The schools are attended by nearly 12,000,000 children.

Hierarchy.—There are over 100 bishops of the Protestant Episcopal Church in the United States; 53 bishops of the Methodist churches; 16 archbishops and over 80 bishops of the Roman Catholic Church, also a cardinal.

Young Men's Christian Associations.—The membership of these associations in the United States exceeds 400,000. They have over 500 buildings; they own property valued at $37,000,000 and they expend nearly $5,000,000 yearly in their work. Many of the Y. M. C. A. institutions have large libraries and gymnasiums, also educational classes embracing every form of instruction for young men. The work has been so extensively developed that soldiers in camp are able to enjoy the privileges of one or other of the local organizations. In many ways these associations and others formed on the same plan in connection with church work have been of inestimable value throughout the United States as factors in securing more extended culture and greater Christian civilization.

Young Women's Christian Associations.—There are, in the United States, nearly 600 student organizations connected with the Y. W. C. A. associations, of which there are about 620. The classes of work and general administration are in many respects similar to those of the Y. M. C. A.

Mission Work.—The mission work carried on from year to year in connection with churches and other religious and semi-religious organizations in the United States is co-extensive with the world's confines. The yearly expenditure represents several millions of dollars and engages the active and exclusive services of many thousands of American men and women, who frequently make personal sacrifices to further the growth of Christian religion and sentiment. Missionary work is being done continuously by more than 100 American societies, these organizations maintaining nearly 9,000 stations, with over 5,000 male and female missionaries and over 20,000 native helpers. These mission stations have nearly 600,000 communicants on their rolls.

Other Religious Organizations.—Among the organizations classified as religious and doing an important work in their respective fields are the American Tract Society, which has circulated nearly 17,000,000 books on Christianity, and the American Bible Society, which has distributed over 76,000,000 Bibles, including editions in many foreign languages.

An organization of great influence in the United States is the Young People's Society of Christian Endeavor. The national membership is considerably over 2,000,000, and consists almost exclusively of boys and girls under 18 years of age.

GOVERNMENT.

The government of the United States is based on a federal system deriving vitality from the constitution of 1787-89, which took the place of the 'articles of confederation,' drafted by the continental congress and adopted 1778. Both compacts were drafted and adopted by duly chosen representatives of the whole people; and while reserving large powers to the several states, each conceded to the congress certain comprehensive powers in order to insure greater general protection, a closer union, and a larger mutual and national welfare (see CONFEDERATION OF THE THIRTEEN AMERICAN COLONIES). The Constitution of the United States specifies the powers which the people of the states were willing to grant to the federal government, and prohibits both the general government and the states from exercising certain powers, the one against the other; thus preserving to the states a large freedom in all matters pertaining to their own government, and giving to the federal government rights to be exercised for defense and advancement of all the states as a single national body (see the CONSTITUTION, Art. I., Sec. 8, 9, 10).

Under the constitution the executive authority is vested in a president, elected for four years; his salary is $75,000 per annum, with family and official residence in the executive mansion, popularly known as the White House.

No person excepting a natural-born citizen who has attained the age of 35 years is eligible to the office. A vice-president is elected at the same time and for the same term as the president; he has a salary of $15,000 per annum, and is president of the senate or upper branch of the congress. In case of the removal of the president from office, or of his death, resignation, or inability to discharge his official duties, the vice-president succeeds to the executive authority; and, by act of congress approved 1886, Jan. 19, in case of the inability of the president and the vice-president to act, the secretary of state shall act as president during the disability; if there be no secretary of state, then the secretary of the treasury shall act; and the remainder of the succession is the secretary of war, attorney-general, postmaster-general, secretary of the navy, and secretary of the interior, providing in each case that the officer succeeding to the executive authority had been appointed to the cabinet by the advice and consent of the senate, and also was eligible to the presidency under the constitution.

From the adoption of the federal constitution till the time of writing (1909) there were 27 *Presidents*—viz.: (1) Geo. Washington, federalist, 2 terms, 1789-97; (2) John Adams, federalist, 1797-1801; (3) Thomas Jefferson, republican (see POLITICAL PARTIES), 2 terms, 1801-09; (4) James Madison, republican, 2 terms, 1809-17; (5) James Monroe, republican, 2 terms, 1817-25; (6) John Quincy Adams, republican, 1825-29; (7) Andrew Jackson, democrat, 2 terms, 1829-37; (8) Martin Van Buren, democrat, 1837-41; (9) William Henry Harrison, whig, 1841, Mar. 4—Apr. 6; (10) John Tyler, democrat, 1841, Apr. 6—1845; (11) James K. Polk, democrat, 1845-49; (12) Zachary Taylor, whig, 1849, Mar. 5—1850, July 9; (13) Millard Fillmore, whig, 1850, July 9—1853; (14) Franklin Pierce, democrat, 1853-57; (15) James Buchanan, democrat, 1857-61; (16) Abraham Lincoln, republican, twice elected, 1861-65, Apr. 15; (17) Andrew Johnson, republican, 1865, Apr. 16—1869; (18) Ulysses S. Grant, republican, 2 terms, 1869-77; (19) Rutherford B. Hayes, republican, 1877-81; (20) James A. Garfield, republican, 1881, Mar. 4—Sep. 20; (21) Chester A. Arthur, republican, 1881, Sep. 20—1885; (22) Grover Cleveland, democrat, 1885-89; (23) Benjamin Harrison, republican, 1889-93; (24) Grover Cleveland, democrat, 1893-97; (25) William McKinley, republican, 1897-1901; (26) Theodore Roosevelt, republican, 1901-1909; (27) W. H. Taft, 1909—. The *Vice-presidents* were: John Adams, 1789-97; Thomas Jefferson, 1797-1801; Aaron Burr, 1801-05; George Clinton, 1805-13; Elbridge Gerry, 1813-17; Daniel D. Tompkins, 1817-25; John C. Calhoun, 1825-33; Martin Van Buren, 1833-37; Richard M. Johnson, 1837-41; John Tyler, 1841-45; Geo. M. Dallas, 1845-49; Millard Fillmore, 1849, Mar. 5—1850, July 9; William R. King, 1853-57; John C. Breckinridge, 1857-61; Hannibal Hamlin, 1861-65; Andrew

Johnson, 1865, Mar. 4—Apr. 16—Schuyler Colfax, 1869-73; Henry Wilson, 1873, Mar. 4—1875, Nov. 22; William A. Wheeler, 1877-81; Chester A. Arthur, 1881; Thomas A. Hendricks, 1885; Levi P. Morton, 1889-93; Adlai E. Stevenson, 1893-97; Garret A. Hobart, 1897-99; Theodore Roosevelt, 1901; Charles W. Fairbanks, 1905-1909; James S. Sherman, 1909—.

The president and vice-president are elected by electors chosen in each state by popular vote, the number being equal to the number of congressmen and senators apportioned to the several states after each census. See PRESIDENT and VICE-PRESIDENT, ELECTION OF.

The president is assisted in discharge of his duties by a cabinet or council, comprising the secretaries of state, treasury, war, navy, postoffice, interior, justice, agriculture, and commerce and labor; and to facilitate official business each of these departments is subdivided into numerous bureaus, whose chiefs report directly to the secretaries, and they in turn to the president. The secretaries hold office during the pleasure of the president, generally through his term. See SECRETARIES OF EXECUTIVE DEPARTMENTS.

The legislative authority is vested in a congress consisting of a senate and a house of representatives. Each state is entitled to two senators, who are elected by the state legislatures for terms of six years. A legal candidate for senator must be 30 years old, a citizen of the United States for 9 years, and a citizen of the state in which he is a candidate. The number of representatives to which each state is entitled is fixed by congressional apportionment, based on the population enumeration. By the census of 1880, the ratio of representation was fixed at 151,911, and 1883, Mar. 4, the house comprised 325 representatives. The census of 1900 raised the ratio to 194,182, and 1909, Mar. 4, the house comprised 391 representatives, apportioned as follows: Alabama, 9; Arkansas, 7; California, 8; Colorado, 3; Connecticut, 5; Delaware, 1; Florida, 3; Georgia, 11; Idaho, 1; Illinois, 25; Indiana, 13; Iowa, 11; Kansas, 8; Kentucky, 11; Louisiana, 7; Maine, 4; Maryland, 6; Massachusetts, 14; Michigan, 12; Minnesota, 9; Mississippi, 8; Missouri, 16; Montana, 1; Nebraska, 6; Nevada, 1; New Hampshire, 2; New Jersey, 10; New York, 37; North Carolina, 10; North Dakota, 2; Ohio, 21; Oklahoma, 5; Oregon, 2; Pennsylvania, 32; Rhode Island, 2; South Carolina, 7; South Dakota, 2; Tennessee, 10; Texas, 16; Utah, 1; Vermont, 2; Virginia, 10; Washington, 3; West Virginia, 5; Wisconsin, 11; and Wyoming, 1. Representatives are elected directly by the people, for terms of two years, and senators and representatives receive $8,000 each per annum. A legal candidate for representative must be 25 years old, a citizen of the United States for 7 years, and a citizen of the state in which he is a candidate. Vacancies in the senate are filled by appointments by the governors, pending election by the legislatures at their

next ensuing session; and vacancies in the house by special elections in the districts in which the vacancies occur. The vice-president of the United States is president *pro tem.* of the senate; the speaker of the house is a member elected by his fellow-members. The senate has the sole power of confirming or rejecting certain nominations to office by the president, and of approving or rejecting treaties; and the house has the sole power of originating legislation involving raising and expending money. In cases of impeachment, the house prepares the articles and prosecutes them, and the senate sits as a court, the chief-justice of the United States supreme court presiding in the case of the impeachment of the president. Each house of congress makes its own rules, but neither may adjourn for more than three days without the consent of the other.

The judicial authority is vested in a supreme court, consisting of a chief-justice, salary $13,000 per annum, eight associate justices, salary each $12,500 per annum; in 9 circuit courts, salary of judges $7,000 each per annum; in 83 district courts, salary of judges $3,000-$5,000 each per annum; in 7 territorial courts, with a chief-justice and two to four associate judges each—salary of judges $6,000 each per annum; in a court of claims, with one chief-justice, salary $6,000, and four associate judges, salary of each $6,000 per annum; and in a supreme court of the District of Columbia, with a chief-justice, salary $4,500 per annum, and five associate judges, salary of each $4,000; a court of appeals of the District of Columbia, with a chief-justice and 5 associate justices; and a United States court of private land claims, with a chief justice and 4 associate justices. Judges of United States courts who, after serving 10 years and reaching the age of 70 years, resign their office, are entitled to full salary for life.

The District of Columbia is under the direct jurisdiction of the congress: the territories have a special form of government, with officers appointed by the president of the United States. In general the states are governed after the manner of the general government, the government corresponding to the president, the legislature in two branches to the congress, and the courts of one to those of the other. For differences and details in the government of the states, see their respective titles.

ARMY AND NAVY.

The constitution gives to congress the power to provide for the common defense and general welfare of the United States, 'to declare war,' 'to raise and support armies,' and 'to make rules for the government and regulation of the land and naval forces.' The responsibility, therefore, for the common defense rests with congress, for all the power essential to meet it is vested in the legislature of the nation, which has supreme control.

During the War of the Revolution General Washington was unanimously elected 1775, June 15, 'to command all the continental forces raised or to be raised, for the defense of American liberty,' but on assuming command, he found an heterogeneous and undisciplined force, and immediately took measures to bring order out of confusion; and the general having recommended to the congress and pointed out the necessity for a war office, that body, in 1776, June 13, created a board of war, composed of its own members, which body was the germ of the war department of our government. During 1781 the continental congress, having under consideration a plan for the arrangement of the civil executive departments, established among others the office of secretary of war, to which Major-General Lincoln was elected, and at this juncture several acts were passed defining the duties of the office, organizing various of the staff corps, and providing for a military establishment.

From that period, although congress has made appropriations for the support of the army, and passed laws for its better efficiency, the evolution of organization and equipment and of the general (administrative and supply) staff has only been accomplished through tentative measures, and to meet emergencies. It is of little interest, therefore, to review its history in this respect, for the past few years have brought about a complete revolution in the organization, equipments, tactics, and armaments of an army.

From the early history of the country the sentiment of the people as expressed through the congress has always been opposed to a standing army in time of peace, but the constitution itself declares that 'a well-regulated militia being necessary to the security of a free state, the right of the people to keep and bear arms shall not be infringed.' It has been the continuous policy of the government to maintain only a small army, and to rely in any great war upon the volunteers, and after each, to disband the citizen soldiery and reduce the regular establishment to a peace basis.

With the exception of periods of actual warfare, the functions of the regular army are to man the sea coast fortifications, which protect our harbors and great cities from hostile attack, and to garrison the outposts on the western frontier, and at such strategic points as congress determines to be suitable; to be always ready to fight for the country in any sudden emergency which may come upon it before there is time to raise a volunteer force, and during the time such a force is being raised; to constantly study, and experiment upon, and exercise in, all the improvements in military science, both in arms, ammunition, equipment, supplies, sanitation, transportation, drill and tactics; to furnish a nucleus of officers and men thoroughly familiar with the business for strengthening and ready instruction of the volunteer army.

Strength and Organization.—The first act passed by congress was 1789, Oct. 29, providing for a permanent force of 46 officers and 840 men. The army as constituted in 1910 is the resultant of the acts of 1901, Feb. 2; 1907, Jan. 25, and 1908, Apr. 23. It comprises 15 regiments of cavalry, with 765 officers and 13,266 enlisted men; six regiments of field artillery, 220 officers and 5,245 men; a corps of coast artillery, of 170 companies, 628 officers and 19,321 men; 30 regiments of infantry, 1,530 officers, and 26,616 enlisted men; three battalions of engineers, with 2,002 enlisted men, commanded by officers detailed from the corps of engineers. In addition there are: The Porto Rico regiment of infantry, with 31 officers and 576 men; staff corps, Military Academy, Indian scouts, etc., 8,900 enlisted men and a provisional force of 50 companies, 166 officers and 5,508 enlisted men, in the Philippines, constituting a force of native police. The total on active list is 4,477 officers and 77,-743 enlisted men, exclusive of the provisional force and the hospital corps. The law provides that the total enlisted strength shall not exceed 100,000 at any one time. On the active list, Nov. 1, 1908, were: One lieutenant-general, 8 major-generals, 28 brigadier-generals, 125 colonels, 141 lieutenant-colonels, and 411 majors. The army is officered from the graduates of the West Point Military Academy, and in the case of vacancies in the grade of second lieutenant from among the enlisted men of the army who are authorized by law to enter a competitive examination, after two years' service, provided they be between the ages of 21 and 30, unmarried, and physically and morally qualified. To obtain a commission the candidate must pass an educational and physical examination before a board of officers. The board also takes into consideration the character, capacity, and military record of the candidate. Many well-educated young men, unable to obtain appointments to West Point, enlist in the army for the express purpose of becoming officers through this medium. Civilians are appointed to vacancies that may be left when the two first classes have been exhausted. To be eligible for appointment the candidate must be a citizen of the United States, unmarried, between the ages of 21 and 27 years, and must be approved by an examining board as to habits, moral character, physical ability, education, and general fitness for the service.

The enlisted men are enlisted by recruiting officers, who are constantly on duty, as it is not easy to keep the army up to its legal maximum because of the failure of the retiring men to renew their enlistments.

In addition to the pay ($15 per month for the private being the minimum), all soldiers receive from the government, rations, clothing, shelter, medicine and medical attendance, and certain increases in the fixed pay for continuous service. Soldiers can deposit their savings with the paymasters, and are allowed 4 per centum per

annum thereon on final discharge. For those who have served honestly and faithfully 20 years, or who have been discharged for wounds received or disease incurred in service, a comfortable home is maintained in the city of Washington, toward the maintenance of which each soldier contributes 12½ cents per month from his pay, and all court-martial fines and forfeitures and pay due deserters go to the home.

In addition to the combatant force proper, the law authorizes the enlistment of musicians; for the cavalry troops, cooks, blacksmiths and farriers, saddlers and wagoners; for the artillery corps, electricians, cooks, mechanics and artificers; and cooks and artificers for the infantry. Special technical skill is required for enlistment in the engineer, signal and hospital corps.

Militia.—The militia becomes national only when called into the actual service of the federal government. The constitution makes it the duty of congress to provide for the arming and training of a militia force, and 'for calling forth the militia to execute the laws of the Union, suppress insurrections, and repel invasions.' Though the necessity for a well-regulated militia to the security of a free state is recognized by the constitution, the arguments and the logic of facts have alike failed to secure that attention demanded by the gravity of the subject prior to the act of 1903, Jan. 21, which brings the militia laws to conform to modern requirements for efficiency and effectiveness, although repeated efforts have been made to accomplish this result from the day of Washington.

The military reserve of the United States is more than 10,000,000 men, but the volunteer organizations maintained in the states have about 100,000 men.

The president is commander-in-chief of the militia of the several states when called into the actual service of the United States; and is empowered to call out these forces in event of invasion, actual or imminent, and in cases of insurrection or rebellion against the authority of the United States or any one of the states thereof, for a term of service not exceeding nine months. While so employed the troops receive the pay, rations, etc., of regular soldiers, are subject to the rules and articles of war, and their officers take precedence in rank next after officers of like grade in the regular service, or in such volunteer organizations as may also be in the service of the United States. The appointment of the officers (to the grade of brigadier-general) and the authority for training the militia according to the discipline prescribed by congress are expressly reserved to the respective states.

The relations of the National Guard, however, to the federal government have never been defined or settled. The confusion, controversy, and bad feeling arising from this uncertain status have been made painfully apparent

during the Civil war, and at the beginning of the war with Spain.

The militia is capable of being utilized, first, as active militia when called out by the president for the specific purposes enumerated in the constitution; second, as an already organized volunteer force when its organizations respond as such to calls for volunteers for general military purposes under authority of congress; and, third, as the great school of the volunteer soldier, the benefits of which are received by the country when the members of the guard respond individually to calls for volunteers.

Under the militia law the regularly enlisted, organized, and uniformed active militia (popularly known as the National Guard) in the several states and territories and the District of Columbia, constitute the organized militia of the United States; and provides that the organization and discipline thereof shall conform with that provided for the regular and volunteer armies; and contemplates establishing closer relations and better co-operation between the National Guard and the regular army, and to promote the general efficiency and dignity of the guard as a part of the military system of the United States.

To aid in accomplishing these objects, the law provides that the general government shall furnish to the guard the same arms which it furnishes to the regular army, and for the voluntary participation by the guard with the regular army in maneuvers and field exercises for brief periods in each year. The law also contains provisions making the National Guard organizations which choose voluntarily to go beyond the limitations of militia service in effect a first volunteer reserve. It also provides for ascertaining by practical tests, in advance of a call for volunteers, the fitness to hold volunteer commissions, of members of the National Guard, graduates of the military schools and colleges, and other citizens with military training, thus constituting an eligible list from which in case of a call for volunteers officers may be taken.

The military forces of the United States are, therefore, as follows:

1. A regular army, capable of enlargement by the president when he sees war coming, to 100,000 men.
2. Such of the organized militia, trained as National Guard, as the president shall see fit to call into the service of the United States.
3. Such other volunteers as congress may deem necessary to call forth from the states according to the respective quotas.

The Navy.—The American navy came into existence in 1775 after the close investment of Boston by Washington had cut off all supplies to the British troops, save such as might arrive by water. To intercept these some small vessels were armed and manned by New England seamen, first under the auspices of Rhode Island and

Connecticut, and afterward by authority of the congress which organized a naval committee with John Adams as its head. These little craft not only deprived the enemy of succor, but captured enough prizes to furnish the colonial army with war material, without which it could not have continued hostilities.

Early History.—In 1776, the navy had 31 cruisers mounting 586 guns, and no less than 136 privateers, mounting 1,360 guns, had also been fitted out. Including the flotilla on Lake Champlain, the government war vessels in service during the Revolution numbered in all 64, carrying a total of 1,242 guns. This force captured 196 vessels worth about $6,000,000, and the privateer auxiliaries, numbering 792, mounting over 13,000 guns, took 600 British ships, valued at $18,000,000. Insurance on British bottoms rose from 2 to 15 per cent. This unprecedented destruction of British commerce, and the fact that the colonies were literally supporting their forces from captured British goods, were among the strongest arguments which led to peace.

The *Hancock, Randolph, Raleigh* and other cruisers authorized by congress were excellent ships, and the *Alliance* and *Confederacy,* built toward the close of the war, had no superiors afloat. They were mainly armed with 4- to 18-pounder guns. Progress, however, stopped when independence was achieved, and the vessels were sold and men discharged. In 1794, a law re-establishing the navy under the secretary of war was enacted and six frigates authorized. Of these, three were constructed, the *Constitution,* 44 guns, 1,576 tons; *Constellation,* 36 guns, 1,265 tons; and *United States,* 44 guns, 1,576 tons. The *Constitution* is still afloat. Three were abandoned and the material sold. Under the pressure of French spoliations, however, the navy was increased and at the beginning of the quasi-war with France in 1798 it aggregated 22 ships with 456 guns and 3,484 men. This little force during the two and a half years of hostilities captured 84 French armed vessels mounting over 500 guns. The military discipline of the navy here begins: the American officers, largely recruited from merchantmen, learned from the commanders of the British war vessels in the West Indies the traditions and customs of the older service. Then also came in the carronade or short gun, with little penetrating but great smashing power. At the end of the French war, another reduction of the navy took place. The theory that ships and guns could be called into existence when needed, as easily as log cabins, even at that early day, had become well rooted. Accordingly after cutting our force down to 15 vessels, we deemed it wise to present the Dey of Algiers with 26 barrels of silver dollars and the fine frigate *Crescent* to induce him to let our commerce alone. Tripoli in her turn, being thus encouraged, demanded special blackmail. Thereupon the navy once more rejuvenated, not merely destroyed the Barbary pirates, but emerged from the war in 1805, a

sea power hereafter to be taken into account in the world's diplomacy. It was during these campaigns that disciplinary routine was so highly perfected by Commodore Edward Preble that it has remained with little substantial alteration to the present day. It was then also for the first time that the American navy was accorded all the formal honors of a national service by the warships of other countries.

War of 1812.—When the war of 1812 with Great Britain began, the navy had 17 ships aggregating 15,300 tons and carrying 442 guns and 5,025 men. It had no yards, no docks, no adequate means of any sort for repair or refitting. The British navy, fresh from the victories of Trafalgar and the Nile, had over seven times this force on the North American station alone. Within seven months the United States ships had reduced three British frigates to wrecks and taken 500 merchantmen—a result which astounded the world. The *Constitution,* 55 guns, destroyed the *Guerrière* in 40 minutes and the *Java* in 1 hour and 55 minutes, and the *United States,* 54 guns, dismantled the *Macedonian,* 29, in about an hour and a half. The subsequent sloop actions were almost equally decisive. The noteworthy fact of these duels was the destructive character of the American fire—which literally tore the British ships to pieces and converted their decks into slaughter-houses.

Before the war was over, the English were building ships on the 'exact lines' of the American 44-gun frigates, and cutting down some of their most famous line-of-battle ships to compete with them. After peace had been secured, the permanent establishment of the navy was fixed at 12 ships of the line, 14 first class frigates, 3 second class frigates, 6 sloops-of-war, and a proportionate number of smaller vessels. The more famous craft built between 1814 and 1825 were the 74-gun ships *Washington, Franklin, Columbus, Ohio,* and *Delaware,* which were armed with 12 8-inch and 70 32-pounder guns. Meanwhile the possibilities of steam propulsion were looming up, and from the *Dunologos,* built by Fulton in 1813, until the breaking out of the Civil war, this type of marine architecture had reached the point where the propeller had taken the place of the paddle-wheel, and the screw war vessels of the United States navy were as graceful as yachts, and the most formidable of their class. The great naval development of the Civil war was the raft-like *Monitor* (q.v.). She revolutionized marine warfare, and made a wooden ship as much out of date as a Roman galley. The armored casement type was to some extent used by the Confederates, but it was not at first so successful as the turret type, and it is only since 1900 that it has been properly appreciated, and assumed a really prominent place in naval construction.

After the Civil war, the navy as usual was rapidly reduced—the total number of vessels in commission in the fall of 1866 being but 115. The monitors were laid up

at League Island and gradually destroyed. Five which still survive, though practically useless, were permitted a brief harbor service during the Spanish war. Two, however, of the more formidable class, the *Miantonomah* and the *Monadnock,* made long voyages respectively to Europe and around Cape Horn—thus for the first time demonstrating the sea-going capacity of low freeboard turret ships and dooming to final extinction the wooden man-of-war. Gradually but steadily the depletion of the navy list continued and vessel after vessel was sold. Many were broken up under the law decreeing destruction if needed repairs should be found to cost more than 20 per cent of the value—and finally in 1881, so far as ships went, the country was little better than defenseless. This condition was not due to a failure to build ships, but so poorly were they constructed and designed with so little shell, the secretary of the navy could remark even as late as 1887, 'It is often the subject of wonder what has become of the $70,000,000 spent upon war vessels since the close of the war, in view of the fact that their is now no navy.'

An advisory board appointed in 1881 declared in favor of a steel navy, and iron construction was thenceforth doomed. It recommended the construction of 21 armored and 70 unarmored vessels and various other kinds, but it was not until 1887 that construction began, for up to that time there was not a plant on the continent where such vessels could be built. The outbreak of the Spanish war in 1898 found the navy equipped with 77 vessels, including several coast line battleships, and the heavily armed cruisers. The war developed the remarkable preparedness of the navy, which practically annihilated that of Spain in a campaign of 110 days. The chief naval event apart from the battle of Santiago and Manila was the famous rush of the *Oregon* from San Francisco to Jupiter Inlet, Fla., around Cape Horn, a distance of some 14,000 miles in 68 days, which she accomplished without accident, arriving in condition for immediate service.

At the beginning of 1909, the naval strength of the United States was: Battleships, first and second class, 27; armored cruisers, 10; cruisers, first class, 5; cruisers, second class, 7; cruisers, third class, 16; torpedo boat destroyers, 16; torpedo boats, 36; submarines, 12; monitors, 10; wooden cruisers, 4; gunboats, 38; transports, 7; supply ships, 7; hospital ship, 1; colliers, 15; converted yachts, 24; tugs, 42; training ships (sailing), 5; reviewing ships, 9; and 10 of various kinds not fit for sea service. There were in addition under construction 6 first class battleships, 15 torpedo boat destroyers, 15 submarines, 1 gunboat, 7 colliers, and 2 tugs.

One of the most spectacular of cruises was the sailing of the United States battlship fleet around the world, departed from the eastern coast Dec. 16, 1907, and returning without mishap on Feb. 20, 1909. When the fleet sailed Admiral Evans, in command, declared that it was

ready for a 'fight or a frolic.' It proved to be the latter, and while the proposition to take the trip was vehemently opposed when first broached, it was so successful in its results that those who felt most disgruntled could, after the return, find no more cogent reason for even a lukewarm opposition than the expense attending the excursion.

The Personnel.—As stated above, the discipline and routine of the navy was perfected under Commodore Preble previous to the war of 1812, and so thorough and satisfactory has this proven that no navy in the world has so fine a record for everything that makes for efficiency. Officers are commissioned or warranted. Commissioned officers belong either to the 'line' or to the 'staff.' The grades of line officers and the number allowed by law in each grade are admiral 1, rear admirals 18, captains 70, commanders 112, lieutenant-commanders 170, lieutenants 300, lieutenants, junior grade, 75, ensigns and midshipmen, indefinite. The staff officers include the medical corps, consisting of 15 medical directors, 15 medical inspectors, 56 surgeons, 55 passed assistant surgeons, and 53 assistant surgeons; the pay corps of 13 pay directors, 14 pay inspectors, 40 paymasters, 30 passed assistant paymasters, and assistant paymasters indefinite. The chaplains of various grades number 24; the professors of mathematics 12, naval constructors 43, civil engineers 24, and admiral's secretary 1. All line officers, excepting a few yearly appointed from the warrant officers, are graduated from the United States Naval Academy. Promotion up to rear admiral is by seniority only—subject to physical and professional examination at each step. The office of admiral is personal and expires with the individual holder. The staff officers are promoted by seniority in their several corps. The warrant officers include boatswains, gunners, and carpenters, in each of which corps there are two grades, chief sailmakers, warrant machinists, pharmacists, and mates. The great majority are appointed from the enlisted force. Chief warrant officers rank with but after ensigns. Promotion in the warrant grades is by seniority.

Enlisted Men.—Only citizens of the United States can be enlisted. The recruit must be able to write and speak English, have no physical disabilities, nor be a deserter or a minor under 14 years of age. The age limits vary with the rating—thus on first enlistment, a landsman must be between 18 and 25, unless he has a mechanical trade, when he can enlist up to 35, which is for all ratings the maximum. The enlistment term is four years—no enlistments for special service are allowed. Reenlistment requires proof of creditable discharge. Enlisted men are classified into chief petty officers, petty officers of the first, second and third classes, and seamen of the first, second and third classes. They are again classified into the seaman branch, artificer branch, special branch and messmen branch. The seaman branch in-

cludes such petty officers as boatswains' mates, gun captains, and the like, and ordinary seamen, landsmen, together with the three classes of naval apprentices. The artificer branch includes all the machinists, electricians, carpenters, firemen and coal passers; the special branch, the stewards, hospital attendants and musicians; and the messmen branch, the cooks, stewards and mess attendants. Petty officers are appointed by captains of ships from the enlisted force. Two years' service at sea is required for rating as ordinary seaman and four years for seaman. Gun pointers are selected for merit and any one is eligible who shows the necessary natural aptitude. Those who become expert receive as high as $10 per month in addition to their regular pay.

Apprentices are enlisted between the ages of 16 and 17 with the consent of parents or guardians and must engage to serve until 21. They are instructed in the rudiments at the training station at Newport, R. I., and at San Francisco, Cal., for six months, and then go to the training ships for a year's cruise at sea, after which they are promoted from the third class to the second, and assigned to the fleet. One year later they are rated in the first class and are eligible for petty office. Their instruction is continued during their apprenticeship and they have other special privileges.

The Marine Corps was established by the continental congress in November, 1775. It is a part of the navy and has participated in all its actions. Its grades and pay correspond to those of the army. It has 1 major-general (commandant), 5 colonels, 50 lieutenant-colonels, 10 majors, 55 captains, 55 first lieutenants, and 57 second lieutenants. Retirement is compulsory at age 64 or for disability, and is voluntary at 30 or 40 years under different laws. Officers are very commonly appointed second lieutenants directly from civil life, although many have been selected from graduates of the naval academy. By order of President Roosevelt, the marines were ordered removed from duty aboard ships. This was during the last months of his administration, and before the order could be enforced it was revoked by the new administration.

Naval Policy.—It is the policy of the United States, not to have the largest navy, but one which shall be fully adequate for the maintenance of its peace and in every particular of the highest attainable efficiency. A battleship requires about 40 months to build and it takes 6 years to produce a competent naval officer. So also it takes time to train men to handle the complicated mechanism which is essential to the modern war vessel. The training facilities of the country and the means for obtaining the enlisted force are inadequate. A naval reserve is necessary from which to draw men at once in case of need. A naval militia co-ordinated with the regular service is also of great value, especially for harbor and coast defense. Several states have established such

militia, but its development has been greatly retarded by lack of proper national encouragement and support. The distribution of the naval force in time of peace is in two fleets and four separate squadrons. The North Atlantic fleet includes the east cost of the United States and West Indies, and is divided into the battleship, the Caribbean and the coast squadrons. The Asiatic fleet covers the east Asiatic coast and the Philippines and is divided into the northern and southern squadrons; the European squadron, the South Atlantic squadron which cruises on the east coast of South America, the Pacific squadron, which ranges over the whole west coast of both continents, and the training squadron.

HISTORY.

The territories now occupied by the United States, though they were probably visited on their n.e. coast by Norse navigators about the year 1,000, continued the sole possession of numerous tribes of Indians until the discovery of America by Columbus 1492. The coast from Labrador to Virginia was explored by Sebastian Cabot 1498; Juan Ponce de Leon landed near St. Augustine, Fla., 1513, and explored a portion of that region. Some Spanish vessels from St. Domingo were driven upon the coast of Carolina 1520. By the conquests of Cortes and his followers, Mexico, including Texas, New Mexico, and California, became a province of Spain 1521. Ferdinand de Soto led a Spanish expedition from Florida across Alabama, and discovered the Mississippi river. Sir Walter Raleigh sent two expeditions 1584-5 to the coast of North Carolina, and attempted to form settlements on Roanoke Island. A Spanish settlement was made at St. Augustine, Fla., 1565. Jamestown, Va., was settled 1607; New York, then called the New Netherlands, by the Dutch 1613; Plymouth, Mass., by the English Pilgrims 1620. A large part of the country on the Great Lakes and on the Mississippi was explored by La Salle 1682; and settlements were made by the French at Kaskaskia, Ill., and Arkansas Post 1685; Mobile, Ala., and Vincennes, Ind., 1702; for the early history of the various colonies which now constitute the United States, see the different states and territories. The first effort at a union of colonies was in 1643, when the settlements in Massachusetts, New Hampshire, Rhode Island, and Connecticut formed a confederacy for mutual defense against the French, Dutch, and Indians, under the title 'The United Colonies of New England.' They experienced the benefits of united action in 1754, when an English grant of lands to the Ohio Company brought on the French and Indian war—the French claiming, at that period, as the first explorers, northern England, half of New York, and the entire Mississippi valley. George Washington was sent on his first expedition to remonstrate with the French authorities, and, the colonies being advised to

unite for general defense, a plan for a general government of all the English colonies was drawn up by Benjamin Franklin; but it was rejected by both the colonies and the crown—by the colonies in their wish to preserve their separate independence, and by the crown from jealousy of their united strength. The colonists, however, took active part in the war. Under Major Washington, they joined Gen. Braddock in his unfortunate expedition against Fort Du Quesne, now Pittsburg; they aided in the reduction of Louisburg, Ticonderoga, Crown Point, and Niagara; and rejoiced in the conquest of Quebec, by which the vast n. regions of America became the possessions of Great Britain: see FRENCH WAR (or OLD FRENCH WAR) IN NORTH AMERICA. (Also, for the earlier history, see titles of the respective explorers, places, and battles mentioned above.)

The principles of a representative government were brought to America by the earliest colonists. The colonies themselves were founded by private adventure, with very little aid from government. The Plymouth colony was for 18 years a strict democracy, and afterward a republic under a charter from the crown. It was not till the Protectorate and the reign of Charles II. that the colonies were considered as portions of the empire, to be governed by parliament, when navigation acts were passed to give English ships a monopoly of commerce, when the produce of the colonies was required to be sent to England, and duties were levied on commodities sent from one colony to another. Protests were made against these assumptions; Virginia asserted her right of self-government; and it was not until the English revolution of 1688 that settled and uniform relations were established between England and the colonies.

In 1713, by the treaty of Utrecht (see UTRECHT, PEACE OF), England, which, since the reign of Elizabeth, had imported slaves from Africa into her American and West Indian colonies, obtained a monopoly of the slave-trade, engaging to furnish Spanish America, in 33 years, with 144,000 negroes. A great slave-trading company was formed in England, one-quarter of the stock being taken by Queen Anne, and one-quarter by the king of Spain, these two sovereigns becoming the greatest slave-dealers in Christendom. By this monopoly, slavery was extended in, and to some extent forced upon, all the American colonies.

At this period there was a general feeling of loyalty toward the mother country. The sons of the more wealthy colonists, especially in the south, were educated in England; English literature pervaded the colonies; the British throne was the fountain of honor; the colonies, though distinct, and differing in origin and character—Puritan in the east, Dutch-Reformed in New York, Quaker in Pennsylvania, Roman Catholic in Maryland, and Church of England in Virginia—were yet united by language, common ties, fears, and interests. In 1761 the enforce-

ment of the navigation act against illegal traders, by general search-warrants, caused strong excitement against the government, especially in Boston. The admiralty enforced the law; many vessels were seized; and the colonial trade with the West Indies was annihilated. In 1765 the passing of an act of parliament for collecting a colonial revenue by stamps caused general indignation and led to riots. Patrick Henry, in the Virginia assembly, denied the right of parliament to tax America, and eloquently asserted the dogma 'no taxation without representation.' The first impulse was to unite against a common danger, and the first colonial congress, of 28 delegates, representing 9 colonies, made a statement of grievances and a declaration of rights. The stamps were destroyed or reshipped to England, and popular societies were formed in the chief towns, called 'Sons of Liberty.' In 1766 the Stamp Act was repealed, to the general joy of the colonists; but the principle of colonial taxation was not abandoned; and, 1767, duties were levied on glass, paper, printers' colors, and tea. This renewed attempt produced, 1768, riot in Boston, and Gov. Gage was furnished with a military force of 700 to preserve order and enforce the laws. In 1773 the duties were repealed, excepting 3*d* a pound on tea. It was now a question of principle, and from north to south it was determined that this tax should not be paid. Some cargoes were stored in damp warehouses and spoiled; some sent back; in Boston, a mob, disguised as Indians, threw a cargo of tea into the harbor. To punish this outrage, parliament passed the Boston Port Bill, 1774, by which the chief town of New England was no longer a port of entry, and its trade transferred to Salem.

A fleet comprising several ships of the line, with 10,000 troops, was sent to America; while the colonists, though still asserting their loyalty, prepared to resist the unconstitutional assumptions of the government against the rights of British subjects. Volunteers were drilling in every direction, and depots of provisions and military stores were being gathered. A small force being sent from Boston to seize one of these depots at Concord, Mass., led to the battle of Lexington, the beginning of the war of the revolution, 1775, Apr. 19. [See—here and throughout this historical sketch—the respective titles of principal persons, places, and battles mentioned.] The British troops were attacked on their return, and compelled to a hasty retreat. The news of this event summoned 20,000 men to the vicinity of Boston. The royal forts and arsenals of the colonies were seized, with their arms and munitions. Crown Point and Ticonderoga, the principal northern fortifications, were surprised, and their artillery and stores appropriated. A congress of the colonies assembled at Philadelphia, which resolved to raise and equip an army of 20,000 men, and appointed George Washington commander-in-chief. Bunker Hill, in Charlestown, near Boston, where 1,500 Americans had

hastily intrenched themselves, was taken by assault by the British troops 1775, June 17, but with so heavy a loss (1,054) that the defeat had for the provincials the moral effect of a victory. After a winter of great privations, the British evacuated Boston, carrying away in their fleet to Halifax 1,500 loyal families of refugees.

The British government now put forth a strong effort to reduce the colonies to submission. An army of 55,000, including 17,000 German mercenaries ('Hessians'), was sent, under the command of Sir William Howe, to put down this 'wicked rebellion.' The provincial congress, declaring that the royal authority had ceased, recommended to the several colonies to adopt 'such governments as might best conduce to the safety and happiness of the people'; and the 13 colonies soon adopted constitutions as independent states, 1776, June 7, Richard Henry Lee, of Virginia, offered a resolution in congress, declaring that 'the united colonies are, and ought to be, free and independent states; that they are absolved from all allegiance to the British crown; and that all political connection between them and the state of Great Britain is, and ought to be, totally dissolved.' This resolution, after earnest debate, was adopted by the votes of 9 out of 13 colonies. A committee, consisting of Thomas Jefferson, John Adams, Benjamin Franklin, Roger Sherman, and Robert R. Livingston, was instructed to prepare a declaration in accordance with the above resolution; and the celebrated Declaration of Independence, written by Jefferson, based on the equality of men and the universal right of self-government, and asserting that 'all government derives its just powers from the consent of the governed,' received (1776, July 4) the assent of the universal right of self-government, and asserting that allegiance to the British crown, and declared themselves free and independent states, under the general title of the United States of America—New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, and Georgia—occupying a narrow line of the Atlantic coast between Canada and Florida, e. of the Alleghanies, with population about 2,500,000.

After the evacuation of Boston, Gen. Washington, with the remains of his army, thinned by the hardships of winter, hastened to New York. Gen. Howe, being joined by his brother, Admiral Lord Howe, and Sir Henry Clinton, found himself (July 2) at the head of 35,000 men; defeated the Americans on Long Island 1776, Aug. 27; compelled the evacuation of New York, and secured possession of its spacious harbor and the Hudson river. Gen. Washington, with inferior and undisciplined forces, retreated across New Jersey, closely followed by the English, hoping to save Philadelphia. Newark, New Brunswick, Princeton were taken, and the British awaited the freezing of the Delaware to occupy Philadelphia.

On Christmas night, Gen. Washington, by crossing in boats among floating ice, made a successful night attack upon a Hessian force at Trenton, and gave new courage to the desponding Americans, who recruited the army, and harrassed the enemy with a winter campaign.

In the meantime, Silas Deane and Benjamin Franklin had been sent to France to solicit recognition and aid. The recognition was delayed, but important aid was privately given in money and supplies, and European volunteers—the Marquis de Lafayette, Baron Steuben, Baron de Kalb, Kosciusko, and Pulaski rendering the most important services. Efforts were made to induce the British colonies of Canada and Nova Scotia to unite in the struggle for independence, and an expedition was sent against Montreal and Quebec, led by Generals Montgomery and Arnold. The Canadians refused their aid; Montgomery was killed, Arnold wounded, and the remains of the expedition returned after terrible sufferings. In 1777, after several severe actions in New Jersey, generally disastrous to the Americans, the British took possession of Philadelphia; and Washington, with the remnants of his army, went into winter-quarters at Valley Forge, where they suffered from cold, hunger, and nakedness.

While Washington was unsuccessfully contending against disciplined and overwhelming forces in New Jersey, Gen. Burgoyne was leading an army of 7,000 British and German troops, with a large force of Canadians and Indians, from Canada into n. New York, to form a junction with the British on the Hudson, and separate New England from the rest of the revolted states. His march was delayed by felled trees and destroyed roads; his foraging expeditions were defeated; and after two sharp actions at Stillwater and Saratoga, with but three days' rations left, he was compelled to capitulate, 1777, Oct. 17; and England, in the midst of victories, heard with dismay of the loss of an entire army. The Americans gained 5,000 muskets, and a large train of artillery. Feeling the need of more unity of action, articles of confederation, proposed by Franklin, 1775, were adopted 1777: these constituted a league of friendship between the states, but not a government which had any powers of coercion.

Lord Carlisle was sent to America by the British government with offers of conciliation 1778; but it was too late. France at the same time recognized American independence, and sent a large fleet and supplies of clothing, arms, and munitions of war to their aid; and Gen. Clinton, who had superseded Gen. Howe, finding his supplies at Philadelphia threatened, retreated to New York, defeating the Americans at Monmouth.

The repeated victories of the British armies, the aid afforded by great numbers of Americans who still adhered to the royal cause and furnished during the war not less than 20,000 troops, and the alliance of large

tribes of Indians, who committed cruel ravages in the frontier settlements, did little toward subjugating the country. Portions of the sea-coast of New England and Virginia were laid waste; but the king's troops were worn out with long marches and tedious campaigns, and even weakened by victories. Spain, and then Holland, joined France in the war against England. Paul Jones, with ships fitted out in French harbors, fought desperate battles under the American flag off the English coast. But the king and parliament were determined to maintain the honor of the crown and the integrity of the empire. In 1780, 85,000 seamen were raised, and 35,000 additional troops sent to America, and a strong effort was made to subjugate the Carolinas, where the war became of a bitter partisan character, and was conducted with spirit by Sumter, Marion, and other southern chieftains. Lord Cornwallis, with a large army, marched from Charleston, through North Carolina, pursuing, and sometimes defeating, the American Gen. Gates. Worn out with his success, he arrived in Virginia, where he was confronted by Gen. Lafayette. In the meantime, Admiral de Varney had arrived off the coast with a powerful French fleet, and 6,000 soldiers of the *élite* of the French army, under Count de Rochambeau. Cornwallis was obliged to fortify himself at Yorktown, blockaded by the fleet at Count de Grasse, and besieged by the allied army of French and Americans, waiting for Sir Henry Clinton to send him relief from New York. 1781, Oct. 19, he was compelled to surrender his army of 7,000 men—an event which produced such a change of feeling in England as to cause the resignation of the ministry, and the dispatch of Gen. Sir Guy Carleton to New York with offers of terms of peace. The preliminaries were signed at Paris, 1782, Nov. 30; and peace was concluded between England on one side, and France, Holland, and America on the other, 1783, Sep. 3. The independence of each of the several states was acknowledged, with a liberal settlement of territorial boundaries. In April, a cessation of hostilities had been proclaimed, and the American army disbanded; New York, which had been held by the English through the whole war, was evacuated Nov. 25; Gen. Washington, Dec. 4, took leave of his companions in arms, and Dec. 23 resigned into the hands of congress his commission as commander.

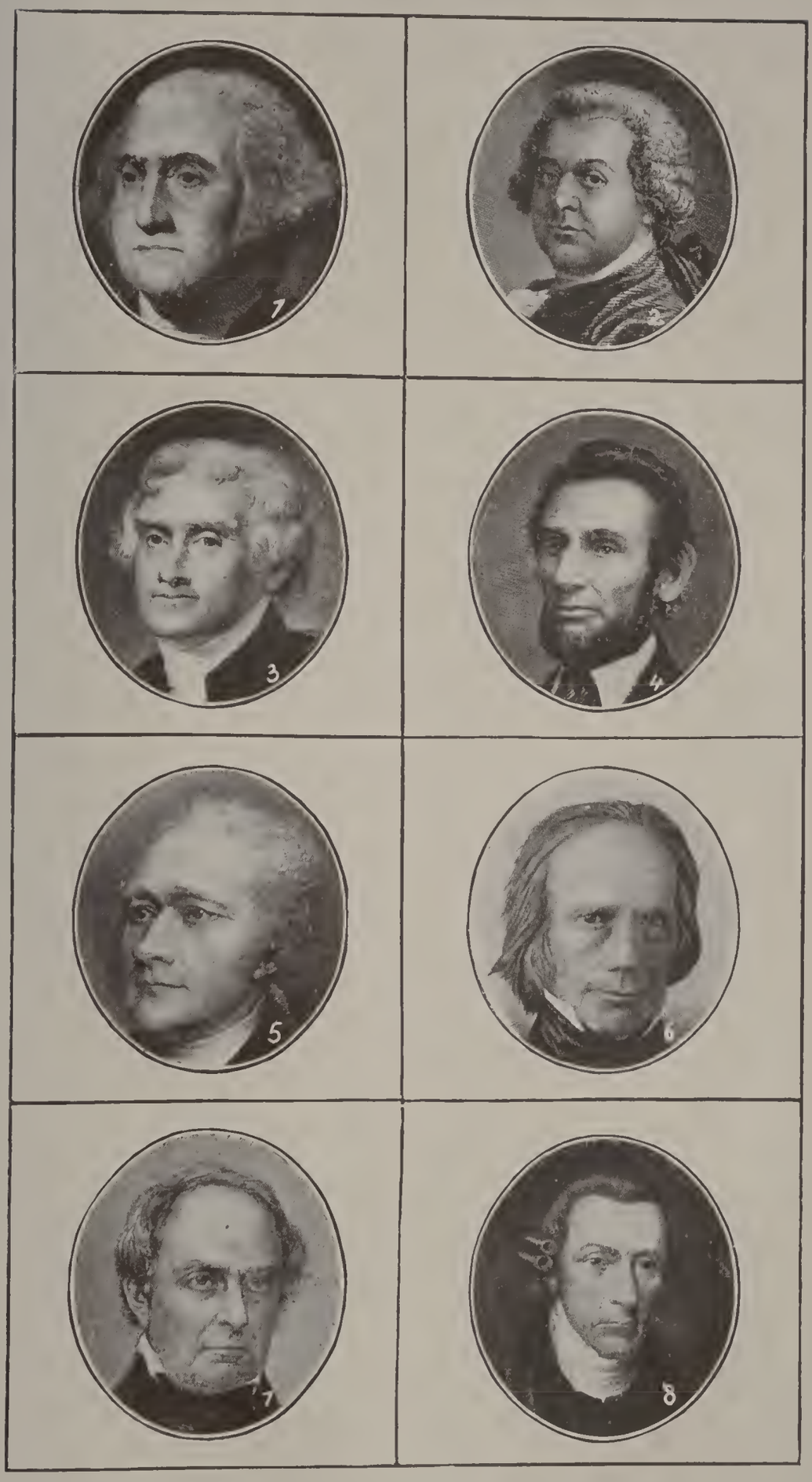
From the retreat of Lexington, 1775, Apr. 19, to the surrender of Yorktown, 1781, Oct. 19, in 24 engagements, including the surrender of two armies, the British losses in the field were not less than 25,000 men, while those of the Americans were about 8,000.

The states were free, but exhausted, with a foreign debt of $8,000,000, a domestic debt of $30,000,000, an army unpaid and discontented, a paper-currency utterly worthless, and a bankrupt treasury. The states were called on to pay their shares of the necessary expenditures; but they also were in debt, and there was no

power to compel them to pay, or to raise money by taxation. In these difficulties, and in view of the failure of the articles of confederation, a convention was summoned by the congress, 1787, to revise these articles. The task was so difficult that the convention resolved to propose an entirely new constitution, granting fuller powers to a federal congress and executive, and one which should act on the people individually as well as on the states. The constitution was therefore framed, which is still the basis of the government; and though it was strongly opposed by many, who believed that the extensive powers granted by it to congress and the executive would be dangerous to the liberties of the people, it was, 1787-8, adopted, in some cases by small majorities, in 11 state conventions, and finally by the whole 13 states, chiefly through the exertions and writings of James Madison, John Jay, and Alexander Hamilton. (See CONSTITUTION OF THE UNITED STATES.) Virginia ratified the constitution with the declaration that she was at liberty to withdraw from the Union whenever its powers were used for oppression; and New York, after Hamilton had declared that no state could ever be coerced by an armed force. (For the political history of this important period, see POLITICAL PARTIES IN THE UNITED STATES; CONSTITUTIONAL CONVENTION; CONVENTIONS, NATIONAL POLITICAL.) George Washington and John Adams, standing at the head of the federalist party, which favored a strong centralized national government, were elected president and vice-president of the United States under the new constitution. The president took the oath under the new constitution, on the site of the present subtreasury building in Wall street, New York; and the government was organized with Thomas Jefferson, secretary of state; Alexander Hamilton, secretary of the treasury; Gen. Knox, secretary of war, and John Jay, chief-justice of the supreme court. Congress assumed the war debts of the several states, and chartered the Bank of the United States, though its constitutional right to do so was strenuously denied by the (then) republican or states' rights party. Washington was re-elected to the presidency 1792. The federalists took the side of England in the great European contest of that time, while the republicans sympathized with the French revolution. There grew up also difficulties between the English and American governments. The Americans accused the English of carrying off large numbers of negroes and other property at the close of the war; while the English accused the Americans of sequestrating the property of loyalists, which they had engaged by treaty to restore to them. These controversies were happily settled by John Jay.

In 1796 Washington, worn and irritated by partisan conflicts and criticisms, refused a third election, and issued his farewell address to the people, warning them against the dangers of party spirit and disunion, and of

AMERICAN STATESMEN.



1. George Washington.
2. John Adams.
3. Thomas Jefferson.
4. Abraham Lincoln.
5. Alexander Hamilton.
6. Henry Clay.
7. Daniel Webster.
8. Patrick Henry.

foreign alliances and entanglements, and giving them advice worthy of one who was said to be 'first in war, first in peace, and first in the hearts of his countrymen.' John Adams was elected president; and Thomas Jefferson, the second choice of the people for the presidency, became, according to the rule at first adopted, vice-president. In 1798 the commercial regulations of France, and the assertion of the right to search and capture American vessels, nearly led to a war between the two republics; indeed the state of affairs has been termed 'the war with France.' The seat of government was removed, 1800, the year after Washington's death, to the city that he had planned for a capital, and which bears his name. John Adams, having lost popularity through his supposed partiality for England, and for other reasons, failed of re-election; and Thomas Jefferson, the foremost man of the republican (now known as democratic) party was chosen president by the house of representatives, after 35 ballotings, with Aaron Burr for vice-president. Tennessee, Kentucky, Vermont and Ohio had now been organized as states, and admitted into the Union. In 1803, the area of the country was more than doubled by the purchase of Louisiana, which then comprised the whole region between the Mississippi and the Rocky Mountains, from France for $15,000,000. The infant navy waged a successful war with Tripoli. In 1805 Jefferson was elected for a second term; but Burr, having lost the confidence of his party, engaged in a conspiracy to seize the Mississippi valley, and found a new empire, with its capital at New Orleans: he was tried for treason, but not convicted. The commerce of America was highly prosperous, her ships doing much of the carrying trade of Europe; but 1806, May, England declared a blockade from Brest to the Elbe, and Bonaparte, in November, decreed the blockade of the coasts of the United Kingdom. American vessels were captured by both parties, and were searched by British ships for British subjects; and those suspected of having been born on British soil, were —in accordance with the doctrine, once a subject always a subject—impressed into the naval service. Even United States men-of-war were not excepted from this process. The British frigate *Leopard* meeting the United States frigate *Chesapeake*, demanded four of her men, and on refusal, fired into her, and the surprised *Chesapeake* struck her flag. British ships were hereupon forbidden United States harbors.

Jefferson, declining a third term, was succeeded by James Madison 1809. The French decrees, prejudicial to neutral commerce, were revoked 1810; but the English decrees continued, a source of loss and irritation, while hundreds of American citizens were in forced service in British vessels. The feeling was increased by a night encounter between the United States frigate *President* and the British sloop-of-war *Little Bell*, 1811, May 16. In 1812, April, an embargo was again declared by congress,

preparatory to a declaration of war against Great Britain, July 19; for which congress voted to raise 25,000 regular soldiers, 50,000 volunteers, and 100,000 militia. Gen. Hull, with 2,000 men at Detroit, invaded Canada; but on being met by a small force of British and Indians, under Gen. Brock, recrossed the river, and made a shameful surrender: he was sentenced to death for his cowardice, but pardoned by the president. A second invasion of Canada was made near Niagara Falls by Gen. Van Rensselaer. One thousand American militia stormed the heights of Queenstown, and the British general, Brock, was killed; but reinforcements arriving opportunely, the heights were retaken, and nearly all the Americans were killed or driven into the Niagara, while the American general was in vain imploring a large body of militia on the opposite bank to cross over to the support of their brethren in arms. They refused, on the ground that the government had no constitutional right to send the militia beyond the frontier. The federal party, from the first opposed to the war, defended this doctrine; and Gen. Van Rensselaer resigned in disgust. American disasters on the land were, however, compensated by victories at sea. 1812, Aug. 19, the United States frigate *Constitution* captured the British frigate *Guerrière;* Oct. 18, the United States vessel *Wasp* took the *Frolic;* Oct. 25, the frigate *United States* captured the *Macedonian;* Dec. 29, the *Constitution* took the *Java.* In most cases the United States ships were larger and their ordnance was heavier; but the immense disparity in losses showed also superior seamanship and gunnery. American privateers took 300 British vessels and 3,000 prisoners. Gen. Proctor, 1813, crossed the Detroit river with a considerable force of British and Indians, and defeated Gen. Winchester, with the usual barbarous results of savage warfare. In April, an American army of 1,700 men captured York (now Toronto), and about the same time another American force of 800 men was defeated with great loss by the Indians near Tecumseh; but the remainder of this campaign was wholly favorable to the Americans. The attempt of the British general Prevost, on Sackett's harbor, was repulsed; the squadron on Lake Erie, consisting of 6 vessels, 63 guns, was captured by Commodore Perry at the head of a United States flotilla of 9 vessels, 54 guns; and this success enabled Gen. Wm. H. Harrison to invade Canada, where he defeated Gen. Proctor in the battle of the Thames, in which the great Indian warrior-chief Tecumseh was killed. In 1813 another invasion of Canada was attempted; and York (now Toronto) was again taken by Gen. Dearborn; and an unsuccessful attempt was made to take Montreal. Villages were burned on both sides. The British also destroyed American shipping in Delaware Bay. At the same period, Gen. Jackson defeated the Creek Indians in Alabama and Georgia, who had been excited to make war on the frontier settlements.

In 1814 Generals Scott and Ripley crossed the Niagara, and sharp actions, with no decisive results, were fought at Chippewa and Lundy's Lane. A British invasion, by Lake Champlain, by Gen. Sir George Prevost, with 14,000 men and a flotilla on the lake, was unsuccessful: Sep. 6, the flotilla was defeated and captured in the harbor of Plattsburg, while the army was repulsed on shore, and retreated with heavy loss. In August a British fleet ascended Chesapeake Bay, took Washington with slight resistance, and burned the government buildings. A subsequent attack on Baltimore was unsuccessful. New York, New London, and Boston were blockaded, and a large expedition was sent against Mobile and New Orleans. 1815, Jan. 8, Gen. Packenham advanced with 12,000 men against New Orleans, which was defended by Gen. Jackson, at the head of 6,000 militia, chiefly from Tennessee and Kentucky, aided by a small force of artillery, recruited from the Barataria pirates. The United States troops were sheltered by a breastwork of cotton bales, and the British assault was met with so deady a fire of riflemen, that it was repulsed, with the loss of Gen. Packenham and several officers, with 700 killed and 1,000 wounded; while the entire American loss appears to have amounted to only 71. This ill-planned and unfortunate action was fought more than a month after peace had been concluded between England and the United States, and was followed by two naval actions in February and March. Though during this war fortune at first favored the Americans on the high seas, it changed completely from 1813, June. June 1, the *Chesapeake* was taken by the *Shannon;* June 3, the *Growler* and *Eagle* were captured by British gunboats; the *Argus* was taken by the *Pelican,* Aug. 14; the *Essex* by the *Phœbe* and *Cherub,* 1814, March 29; the *President* by the *Endymion,* 1815, Jan. 15; the only counterbalancing success being the sinking of the British sloop-of-war *Avon* by the *Wasp,* 1814, Sep. 8. In 1814, Dec., federalists of New England held a convention of 25 delegates at Hartford in opposition to the war and the administration. (See HARTFORD CONVENTION.) Peace between the United States and Great Britain was concluded by the treaty of Ghent (q.v.) 1814, Dec. 24, ratified 1815, Feb. 17.

In 1815 Commodore Decatur, who had taken a distinguished part in the recent war, commanded an expedition against the Algerians—whose corsairs had preyed on American commerce in the Mediterranean—and dictated terms to Algiers, Tunis, and Tripoli.

The democratic-republican party having brought the war to a satisfactory conclusion, the federalists disappeared; James Monroe was elected to the presidency, almost without opposition, 1817, in 'the era of good feeling.' A rapid emigration from Europe and from the Atlantic states to the richer lands of the west, had in ten years added six new states to the Union. Difficulties arose with the warlike southern Indian tribes, whose

hunting-grounds had been invaded; and Gen. Jackson, sent against the Seminoles, summoned to his aid the Tennessee volunteers who had served with him against the Creeks at New Orleans, defeated them, pursued them into Florida, took Pensacola, and banished the Spanish authorities and troops. He was, however, supported in these high-handed measures by the president; and Florida was ceded by Spain to the United States 1819. Alabama and Maine, a slave and a free state, were added to the Union 1820; and the question of the admission of Missouri arose in congress—the question of its admission with or without slavery. (See MISSOURI.) At the period of the revolution, slavery existed in all the states except Massachusetts, but it had gradually been abolished in the northern and middle states, except Delaware, and excluded from the new states between the Ohio and Mississippi by the terms on which the territory had been surrendered by Virginia to the Union. Under the constitution, slaves were not counted in full as a represented population; but by a compromise, three-fifths of their numbers were added to the whites. The slave states were almost exclusively agricultural, with free-trade interests. The free states were encouraging manufactures by protection. The two sections had already entered on a struggle to maintain the balance of power against each other. After an excited contest, Missouri was admitted, with a compromise resolution that in future no slave state should be erected n. of the parallel of 36° 30′ n. lat.—the n. boundary of Arkansas. In the presidential election of 1824 there were four candidates—John Quincy Adams, Andrew Jackson, Henry Clay, and William H. Crawford. There being no choice by the people, the house of representatives chose Adams, John C. Calhoun being elected vice-president. Party and sectional feeling became stronger. Adams and Clay, who had till then acted with the party of Jefferson and Madison, were henceforth identified with what was called the national republican, and later, the whig, which finally, in union with the anti-slavery party, became the republican party. Two of the founders of the republic, John Adams and Thomas Jefferson, died 1826, July 4, the anniversary of the Declaration of Independence—an event which made a profound impression. The four years of Adams's administration, during which there were violent contests on protection for American manufactures and on the powers of the federal government to carry out public works within the states, ended with an excited election contest, which resulted in the triumph of the democratic party, and the election of Andrew Jackson, with John C. Calhoun as vice-president. The bold, decisive, and impetuous character of Gen. Jackson was shown in a general removal of those who held office, down to small postmasters and public servants in the lowest grades, and the appointment of his own partisans. An act for the rechartering of the U. S. Bank was met by a veto of the president, who de-

clared it unconstitutional and dangerous. An Indian war, called the Black Hawk war, broke out in Wisconsin 1832; but the passing of a high protective tariff act by congress caused a more serious trouble. The state of South Carolina declared the act unconstitutional, and therefore null and void, threatening to withdraw from the Union if an attempt were made to collect the duties on foreign importations. The president prepared to execute the laws by military force; Calhoun resigned his office of vice-president, and asserted in the senate the doctrine of state-sovereignty, including the right of secession. (See NULLIFICATION OF UNITED STATES LAWS.) A collision seemed imminent, when the affair was settled by a compromise bill, introduced by Henry Clay, providing for a gradual reduction of duties, until 1843, when they should not exceed 20 per cent. *ad valorem*.

The popularity of Gen. Jackson caused his re-election by an overwhelming majority against Henry Clay, leader of the bank, protective tariff, and internal improvement party; and he entered on his second term with Martin Van Buren of New York as vice-president. The removal of the government deposits from the U. S. Bank in Philadelphia to certain state banks, led to the failure of the bank, and, after some years, to the adoption of Van Buren's plan of an independent treasury. The Cherokee Indians in Georgia, who had attained a degree of civilization, appealed to the president for protection against the seizure of their lands by the state; but they were told that he 'had no power to oppose the exercise of the sovereignty of any state over all who may be within its limits;' and the Indians were obliged to remove to the territory set apart for them w. of the Mississippi. The Seminoles resumed war in Florida 1835; and this tribe of Indians, insignificant in numbers—being in an almost inaccessible region of forest-swamps, and under the crafty leadership of Osceola (q.v.)—kept up hostilities for years, at a cost to the United States of several thousands of men and $50,000,000. Martin Van Buren succeeded Gen. Jackson in the presidency 1837. His term of four years was a stormy one, from the great financial crisis of 1837, which followed a period of currency-expansion and wild speculation. All the banks suspended payment, and the great commercial cities threatened insurrection. Van Buren was firm in adhering to his principle of collecting the revenues of the government in specie, and separating the government from all connection with the banks. His firmness in acting against the strong sympathies of the n. and w. states with the Canadian insurrection of 1837-8, also damaged his popularity; and 1840, the election of Gen. William Henry Harrison, with John Tyler for vice-president, was one of unexampled excitement, characterized by immense popular gatherings, political songs, the use of symbols, and the participation of both sexes to a degree before unknown in America. The whigs triumphed in nearly every state;

Gen. Harrison was inaugurated 1841, Mar. 4, and the rush to Washington for offices was as great as the election had been exciting and remarkable. Worn down with the campaign and the office-seekers, Gen. Harrison died in a month after his inauguration, and was succeeded in office by the vice-president, John Tyler, who, having been a democrat, was no sooner in power than he reverted to his former political principles. He vetoed a bill for establishment of a national bank and other measures of the party by which he had been elected. His cabinet resigned, except Daniel Webster, secretary of state; and others, democrats or neutral, were appointed in their place. During Tyler's administration, the n.e. boundary question, which nearly occasioned a war with England, was settled by Daniel Webster and Lord Ashburton; a difficulty, amounting almost to a rebellion, was settled in Rhode Island, but the most important question agitated was that of the annexation of Texas. This annexation was advocated by the south, as a large addition to southern and slave territory; and, for the same reason, opposed by the whig and anti-slavery parties of the north. Besides, the independence of Texas, though acknowledged by the United States, England, and France, had not been acknowledged by Mexico, and its annexation would be a *casus belli* with that power. The recent admissions of Iowa and Florida into the Union had kept the balance of power even between north and south, but Texas would be an advantage to the south. But the gain of territory, and a contempt for Mexico, overcame these objections, and, 1845, Texas was formally annexed to the United States; and James K. Polk of Tennessee succeeded Tyler in the presidency.

Almonte, the Mexican minister at Washington, protested against the annexation of Texas as an act of warlike aggression, and to guard against a threatened invasion of Texas, Gen. Zachary Taylor was ordered with the United States troops of his military district to its s. frontier. The Mexicans crossed the Rio Grande, and commenced hostilities, 1845, Apr. 26. Gen. Taylor moved promptly forward, and won the victories of Palo Alto, Resaca de la Palma, Monterey, Saltillo, and finally, against great odds—20,000 to 4,759—the hard-fought battle of Buena Vista, a victory that excited great enthusiasm. In the meantime, Gen. Wool had been sent on an expedition to Chihuahua, in n. Mexico; Gen. Kearny to New Mexico; and Capt. Frémont and Commander Stockton took possession of California. 1847, Mar. 9, Gen. Scott landed at Vera Cruz, which he took on the 29th, after a siege and bombardment by land and water. Marching into the interior with a force of about 9,000 men, he found Gen. Santa Anna intrenched on the heights of Cerro Gordo with 15,000 men. Apr. 18, every Mexican position was taken by storm, with 3,000 prisoners, 43 cannon, 5,000 stand of arms, etc. Waiting at Puebla for reinforcements until August, Gen. Scott advanced with

11,000 men toward Mexico city, near which Gen. Santa Anna awaited him with large forces and in strong positions. On Aug. 19 and 20 were fought the battles of Contreras and Churubusco, in which 9,000 Americans vanquished an army of over 30,000 Mexicans in strongly fortified positions. After a brief armistice, hostilities recommenced Sep. 7; and after a series of sanguinary actions, the American army, reduced to about 8,000, entered the city of Mexico; which ended the war. By the treaty of Guadalupe, the United States obtained the cession of New Mexico and Upper California, the United States paying Mexico $15,000,000 and assuming the payment of the claims of American citizens against Mexico. The opposition to the annexation of Texas, and to the war and the acquisition of the newly-acquired territory, now became complicated and intensified by sectional feelings and the opposition to slavery. The northern party demanded that slavery should never be introduced into territories where it had not existed; the south claimed the right of her people to emigrate into the new territories, carrying with them their domestic institutions. (See FUGITIVE SLAVE LAW.) During the debates in congress on the acquisition of the Mexican territories, David Wilmot of Pennsylvania introduced an amendment, called the 'Wilmot Proviso,' providing that there should be neither slavery nor involuntary servitude in the acquired territory: this was voted down, but became a party principle. In 1849, Gen. Taylor, the 'Rough and Ready' victor of Buena Vista, became president, with Millard Fillmore as vice-president. The free-soil party (see POLITICAL PARTIES OF THE UNITED STATES) had nominated Martin Van Buren for president, with Charles Francis Adams for vice-president; the democratic candidate being Gen. Lewis Cass. The liberal party in 1840 had cast 7,609 votes; in 1844 it had 62,300; Van Buren (1848) received 291,263, so rapid was the growth of a party soon destined to control the policy of the government. 1849, Sep. 1, California, rapidly peopled by the discovery of gold, adopted a constitution which prohibited slavery. Violent struggles and debates in congress followed, with threats of southern secession, and protests against interference with slavery. The comparatively few zealous abolitionists of the north denounced the constitution for its support of slavery, and its requirement of the return of fugitive slaves to their owners. The south denounced the violation of the constitution by interference with slavery—a domestic institution of the states—the carrying off of negro slaves secretly by organized societies, and by what was termed the 'underground railway,' and the passage of personal liberty bills in several states, which defeated the Fugitive Slave Law (q.v.) and the requirements and guarantees of the constitution. Henry Clay introduced a compromise into congress, admitting California as a free state, and introducing a new and more stringent law for rendition of fugitive slaves. (See

COMPROMISE MEASURES OF 1850.) President Taylor, more used to the rough life of a frontier soldier than the cares of state, died 1850, July 9, and was succeeded by the vice-president, Millard Fillmore.

The election of Franklin Pierce, 1852, against Gen. Scott, was a triumph of the democratic, states'-rights, and southern party. Jefferson Davis, a senator from Mississippi, son-in-law of Gen. Taylor, and who had served under him in Mexico, was appointed secretary of war. New elements were added to the sectional controversies which agitated the country by the repeal of the Missouri Compromise, and the passage of the Kansas-Nebraska Bill of Senator Douglas, which left the people of every territory, on becoming a state, free to adopt or exclude the institution of slavery. (See also DRED SCOTT CASE.) The struggles of Kansas, approaching a civil war between the free-soil and pro-slavery parties in that rapidly growing territory, resulted in the exclusion of slavery. A brutal assault on Charles Sumner, senator from Massachusetts, by a southerner, named Preston Brooks, in consequence of a violent speech on s. men and institutions, increased the excitement of both sections. The publication 1852 of Mrs. Harriet E. Beecher Stowe's *Uncle Tom's Cabin* aroused so intense and universal interest in the slavery question that the book must be reckoned one of the factors in the developing political struggle. The formation of an anti-foreign and no-popery party, called the 'know-nothing' party, acting chiefly through secret societies, was a singular but transient episode in American politics; though, by breaking up old party affiliations, it doubtless influenced the succeeding election.

In 1856, the republicans, composed mainly of the free-soil party, with some of the less extreme abolitionists, nominated John C. Frémont for the presidency; while the democratic and states'-rights party nominated James Buchanan. Ex-President Fillmore received the 'know-nothing' nomination. The popular vote was—for Buchanan, 1,838,169; Frémont, 1,341,264; Fillmore, 874,534. Buchanan was inaugurated 1857, Mar. 4, with John C. Breckinridge, afterward a general of the Confederate army, as vice-president. A difficulty with the Mormons, which caused the president to send a military force to Utah, was settled without bloodshed. 1859, Oct., John Brown, known in Kansas as 'Ossawatomie Brown,' who, with his sons, had been engaged in the struggles in Kansas, planned and led an expedition for freeing the negroes in Virginia. He made his attempt at Harper's Ferry, on the Potomac, where, after a vain attempt to induce the negroes to join him, he and his small party took possession of one of the government workshops, where he was taken prisoner by a party of United States soldiers, and handed over to the authorities of Virginia, tried and hanged Dec. 2.

In 1860, the democratic party, which, except at short

intervals, had controlled the federal government from the election of Jefferson 1800, became hopelessly divided. The southern delegates withdrew from the convention at Charleston; and two democratic candidates were nominated, Stephen A. Douglas of Illinois and John C. Breckinridge of Kentucky; while the republicans, or united whig and free-soil party, nominated Abraham Lincoln of Illinois; and the native or 'American' party nominated John Bell of Tennessee. The republican convention adopted a moderate and even conservative platform, denounced the John Brown raid, and put forward as a principle, 'the maintenance inviolate of the rights of the states, and especially the right of each state to order and control its own domestic institutions according to its own judgment exclusively.' Still, as the republican party had taken firm stand against further extension of slavery to new states, the country was sectionally divided.

At the election 1860, Nov., Abraham Lincoln received every northern vote in the electoral college except the three of New Jersey, which were given to Douglas, 180 votes; while Breckinridge received the 72 electoral votes of the south. Of the popular vote, Lincoln received 1,857,610; Douglas, 1,365,976; Breckinridge, 847,951; Bell, 590,631. Thus, while Lincoln gained an overwhelming majority of the *electoral* votes given by each state, the combined democratic ballots cast by voters exceeded his by 356,317, and the whole popular vote for other candidates exceeded that for him by 946,948. A small majority, or even plurality, in the northern states was sufficient to elect him.

The south at once acted on what her statesmen had declared would be the signal of their withdrawal from the Union. On Nov. 10, as soon as the result was known, the legislature of South Carolina ordered a state convention, which assembled Dec. 17, and on the 20th unanimously declared that 'the union now subsisting between South Carolina and other states, under the name of the United States, is hereby dissolved;' giving as a reason that 14 of these states had for years refused to fulfil their constitutional obligations. The example of South Carolina was followed by Mississippi 1861, Jan. 8; Florida, 10th; Alabama, 11th; Georgia, 19th; which were followed by Louisiana and Texas, and by North Carolina, Virginia, Tennessee, and Arkansas. Kentucky and Missouri were divided, and had representatives in the governments and armies of both sections.

1861, Feb. 4, delegates from the 7 then seceded states met at Montgomery, Ala., and formed a provisional government under the title the Confederate States of America. A constitution was adopted similar to that of the United States, and the government fully organized, Feb. 18; president, Jefferson Davis of Mississippi; vice-president, Alexander H. Stephens of Georgia; the government was established at Richmond, Va. The secession movement appears to have been nearly unanimous in the more

southern states, and to have been carried in all by decided majorities. As state after state withdrew from the Union, its senators and representatives in congress at Washington resigned their seats; and nearly all the officers of the army and navy, of southern birth—believing that the first and final allegiance was due to their states, and that the action of each state carried with it all its citizens—also resigned their commissions, and tendered their swords to their respective states, and to the Confederacy that those states had formed.

President Buchanan, doubting his constitutional power to compel the seceding states to return to the Union, made a feeble and ineffectual attempt to relieve the garrison of Fort Sumter, in Charleston harbor, closely besieged by the forces of South Carolina. Commissioners were sent to Washington to negotiate for the settlement of the claims of the federal government, and great efforts were made to effect compromises of the difficulties, but without result.

1861, Mar. 4, President Lincoln was inaugurated at Washington. In his address he said: 'I have no purpose, directly or indirectly, to interfere with the institution of slavery in the states where it exists. I believe that I have no lawful right to do so, and I have no inclination to do so.' The opening of hostilities was precipitated by the setting out from New York of an expedition with provisions and reinforcements for the garrison of 75 soldiers in Fort Sumter, in Charleston harbor: the unarmed vessel was fired upon and compelled to withdraw. These were the first shots of the Civil war. The surrender of the fort was demanded and refused Apr. 11; and the batteries around Sumter, manned by South Carolina gunners, opened fire on the fort Apr. 12; and, after a bombardment of 36 hours, the United States commander was forced to surrender the place 1861, Apr. 14. The firing on the United States flag, and the fall of Ft. Sumter, 'fired the northern heart;' President Lincoln's call for 75,000 volunteers to serve 90 days was answered with alacrity—three times that number of men offering themselves. Public sentiment was greatly consolidated in the north for support of the Union and suppression of the rebellion: in the south, men who had wavered between secession and adhesion to the Union were carried into approval of their states' ordinances of secession: the call of the president of the Confederacy for troops, like that of President Lincoln, met cordial response. The border states, Missouri, Kentucky, Maryland, essayed to be neutral: Delaware from the first cast her lot with the Union. The first blood was shed in Baltimore, Apr. 19, when a Massachusetts regiment, on its way to defend Washington, was attacked by a mob. By this time the Confederates had collected a force at Manassas Junction, Va., about 30 m. from Washington, and their line of defense held the left bank of the

Potomac from Fortress Monroe almost to the national capital. From Washington the Confederate lines of defense lay w. to Harper's Ferry; thence through the mountains of w. Virginia and s. Kentucky, crossing the Mississippi below Cairo; thence through s. Missouri and the e. border of Kansas; thence s.w. through Indian Territory and along the n. boundary of Texas to the Rio Grande. The length of this line, with the southern Atlantic and Gulf coasts, is about 11,000 m. Congress, July 13, authorized President Lincoln to shut up the ports of the seceded states; congress also empowered the president to call out 500,000 volunteers for 3 years' service. The first battle occurred at Bull Run (or Manassas) July 21; the Union army of raw undisciplined militia was routed. At Wilson's Creek, Mo., there was another collision, Aug. 10; here neither side gained advantage. Ft. Hatteras, N. C., was captured by United States forces Aug. 29, and Port Royal, S. C., Nov. 7; thus were two important harbors of refuge won for the blockading fleets. In the meantime Gen. George B. McClellan had defeated the Confederates in several minor engagements in West Virginia; after the repulse at Bull Run he succeeded the aged Gen. Winfield Scott as general-in-chief. His first task was to organize the army around Washington. The work of disciplining and fashioning into an effective army the raw levies collected for defense of the national capital and for operations against Richmond, consumed many months; and not till the spring of 1863 was the Army of the Potomac in readiness for a forward movement.

In the meantime, by authority of congress (1862, Feb. 25), the United States treasury issued its notes, which by law were legal tender for payment of all debts, and for all purposes except payment of customs duties and of interest on the national debt. Slavery was prohibited in the District of Columbia; and the army was forbidden to restore runaway slaves to their owners.—The Union Pacific Railroad Co. was incorporated the same year, and the government lent to the company its credit ($16,000 a mile) to aid in the speedy completion of the road: the company also received alternate sections of the public lands through which its line lay.—Specie payment was suspended 1861, Dec.; the price of gold began to rise rapidly 1862, May: it was 1.70 on the dollar in 1863, and 2.85 in 1864. While prices and rents rose 90 per cent., wages rose only 60 per cent. 1861-66. The Morrill Tariff Act increased the tariff rate on dutiable articles from 18 per cent. (as before 1861) to 50 per cent. The internal-revenue taxes amounted (1866) to $310,000,000. In the Confederacy the depreciation of the paper currency was far greater than in the loyal states. Prices of various articles were as follows in Richmond 1864, May: pair of boots $200; coat $350; trousers $100; shoes $125; flour, barrel, $275; corn-meal, bushel, $70; bacon,

lb., $9; fowls, pair, $30; shad $20; potatoes, bushel, $25; white beans, quart, $4; butter, lb., $15; fire-wood, cord, $50. No beef could be bought.

At the beginning of 1862 the w. part of Virginia had separated itself from the parent state. In the w., Gen. Ulysses S. Grant, commanding a part of Buell's army, moved up the Tennessee river, and with a brilliant attack captured Ft. Henry and Ft. Donelson, thus effecting the first great Union success, and breaking the centre of the Confederate line (Feb.). This opened the way for occupation of almost all w. Tennessee, including Nashville, the capital. The theatre of war was now 200 m. within the Confederate border. The first great battle of the war was that of Pittsburgh Landing (Apr. 6, 7), where Grant and Sherman sustained the onset of a Confederate army commanded by Gen. Albert S. Johnston. The Union forces held their ground stubbornly till Buell, with the main army, changed the situation, and the Confederates were driven back to Corinth. The southern cause suffered a grievous loss in this action—their great and beloved commander Johnston falling mortally wounded. The Union armies pushed on to Corinth; the Mississippi down to Memphis was freed from the enemy. Thus the Confederate line was set back through Tennessee fully 200 m., and the advantages gained by the national armies here, as in West Virginia, were thereafter held. A naval expedition under Farragut and Porter, 1862, Apr. 24, had brilliant success in an engagement with the Confederate fleet and shore-batteries, and, in co-operation with a land-force commanded by Gen. Butler, captured and occupied New Orleans Apr. 25. The fleet then ascended the Mississippi, and cleared the river of Confederate vessels and Confederate works as far as Vicksburg. While the Union cause was thus advancing with great strides in the s. and s.w., the Army of the Potomac was preparing for a movement on Richmond. 1862, Mar. 8, occurred the action between the new U. S. *Monitor* (q.v.) and the *Virginia* (old U. S. *Merrimac*) in Hampton Roads (q.v.)—an engagement which, though itself indecisive, resulted in compelling the Confederate iron-clad to retreat to Norfolk, quieting the alarm of northern cities on the Atlantic coast, and revolutionizing the art and science of naval war. Before the end of another year, the United States possessed 75 iron-clad vessels—many hastily prepared for service on the great rivers.

The Confederate army before Richmond occupied strong defensive positions with regard to an attack from the direction of Washington. McClellan therefore wished to take his army to Fortress Monroe, and thence to advance on the Confederate capital, judging that the Confederate armies must follow him; but the president and his advisers believed that this course would leave the capital at the mercy of the enemy, who by a coup might

capture Washington. A portion of the army was therefore detached from McClellan's command, put under command of Gen. McDowell, and ordered to take the overland route as far as Fredericksburg, while McClellan moved up the peninsula toward Richmond: as the enemy withdrew from their positions facing Washington to confront McClellan, McDowell was to join the latter. But the main army spent a month (Apr. 5—May 2) quietly before Yorktown; and when McDowell's army was about to join the main force, he met an obstacle in the freshet-swollen Chickahominy. In this situation he was attacked by Gen. Joseph E. Johnston, and beaten at Seven Oaks and at Fair Oaks, in which battles Gen. Robert E. Lee first appeared as commander of a large army. Gen. Thomas J. ('Stonewall') Jackson moved against the Union forces in the Shenandoah valley, drove them to the Potomac, and so filled Washington with alarm that McDowell's army was withdrawn hastily from Fredericksburg for defense of the capital: then Jackson joined Lee, who attacked McClellan at Gaines's Mill 1862, June 27, cutting off the Union army from its base of supplies on the York river. McClellan was forced to move his right wing s. in order to establish a new base on the James river. In this retreat he was hotly pressed by Lee and Jackson, and McClellan reached his objective point only after the 'seven-days' battles'—the most desperate engagements of the war to that date. Gen. John Pope, having succeeded McDowell in command of the army covering Washington, was attacked and beaten by Jackson at Bull Run Aug. 29; McClellan was recalled to defend the capital. On McClellan's retirement from the peninsula, Lee joined Jackson, and the combined army, passing to the n.w. of Washington, passed through the Blue Ridge Mountains into n.w. Maryland. At Antietam (or Sharpsburg) the Confederate army was overtaken by the Union Army of the Potomac, which had been brought up through Maryland, and the battle of Antietam was fought 1862, Sep. 17. Both sides claimed victory, but Lee was compelled to retreat to his former position. McClellan—being judged not to have followed up his advantage—was removed from command, and succeeded by Gen. Ambrose E. Burnside. The latter, in an attempt to storm the heights behind Petersburg, suffered a disastrous repulse Dec. 13; he was displaced, and Gen. Joseph Hooker succeeded him.

Soon after the battle of Antietam, President Lincoln issued a proclamation summoning the states in rebellion to return to their allegiance before 1863, Jan. 1, under penalty of having all slaves within their borders declared free men. No state complied with the demand, and Jan. 1 the slaves were declared free; for his proclamation, see SLAVERY. The Confederate agents in Europe purchased in England (1862) the fast steamers *Alabama* and *Florida,* and, having put armaments on board, sent them

to sea to prey on American commerce. Soon the flag of the United States disappeared from the ocean, most of the ocean-going shipping being transferred under the flags of other nations. Another Confederate cruiser, the *Georgia,* was afloat 1863. These three cruisers were destroyed in naval conflicts 1864.

While Lee was invading Maryland, Gen. Braxton Bragg, commanding the Confederate armies in Mississippi, having turned the Union line in s. Tennessee, passed into Kentucky, and on retiring into Tennessee bore away much booty. Gen. William S. Rosecrans toward the end of 1862 moved forward from Nashville to attack Bragg, and there was an obstinate struggle, with indecisive result, at Murfreesboro Dec. 31 and 1863, Jan. 1, 2. The western United States armies were now four: that of Rosecrans at Murfreesboro, that of Grant at Corinth, that of Schofield in Missouri and Arkansas; and that of Banks in Lousiana. It was of vital importance to open the Mississippi completely, and the possession of Vicksburg by the Confederates was the remaining obstruction to be removed. The task of conquering this strong position was assigned to Grant. He sought first to take the place from the w. bank of the river. That attempt failing, he crossed the Mississippi s. of Vicksburg, transferring his army in the boats of the river fleet. Here Grant's army had on one side of him, at Jackson, Miss., Gen. Joseph E. Johnston with an inferior force of Confederates: on the other side was Vicksburg, a fortified place occupied by the bulk of the choicest Confederate troops in the w. under Gen. Pemberton. The two Confederate generals were at variance: Pemberton did not wish to owe his expected victory over Grant to Johnston. Grant fell on Johnston's army, scattered it, and made its junction with Pemberton impossible then advancing toward Vicksburg, fighting several sharp battles as he went, he had Pemberton shut up in Vicksburg before the end of May. Pemberton, after a six weeks' siege and continual assaults, surrendered to Grant 1863, July 4 (30,000 prisoners of war, 200 cannon, and 70,000 stand of arms). Port Hudson having surrendered to Gen. Banks July 9, the Mississippi was in the power of the Union armies through its entire length, and the Confederacy was cleft in twain. West of the great river no regular military operations were carried on thereafter, except those which resulted in the defeat of Banks in n.w. Louisiana 1864. The fighting capacity of the Confederacy was seriously reduced by the loss at Vicksburg, whose surrender was only one day after the great Union victory at Gettysburg. While Grant was occupied at Vicksburg, Rosecrans was moving from the e. end of the Union line in Tennessee against Bragg at Chattanooga. Bragg was compelled to retire into Georgia, whither Rosecrans pursued him; but with disastrous result, for the pursuing army was defeated at

Chickamauga creek 1863, Sep. 19-20. At Chattanooga, whither the Union army retreated, Bragg, having occupied all the mountains around, was confident of his ability to compel a surrender of the entire Union force. A part of Bragg's army was even detached under Longstreet to besiege Knoxville. Grant was now ordered to the command at Chattanooga: with him were Gen. William T. Sherman and other officers who had taken part in the operations at Vicksburg. Grant quickly reopened communication with the rear; brought in supplies and reinforcements; and gave the order to dislodge the enemy from his commanding positions on the mountains. Lookout Mountain and Missionary Ridge were brilliantly taken by assault (Nov. 23-25). Bragg was removed, giving place to Gen. Joseph E. Johnston; and Longstreet withdrew from the siege of Knoxville, retreating across the mountains into Virginia.

In the e., the Army of the Potomac, under Hooker, lay at Fredericksburg till 1863, May. Attempting to cross the Rapidan on the way to Richmond, Hooker suffered defeat in the battle of Chancellorsville May 2-3. The Confederate army lost in that action Gen. 'Stonewall' Jackson. In June, Lee was preparing for another invasion of the north, and toward the end of the month his army began to advance northward along nearly the route followed 1862: the Union Army of the Potomac, now commanded by Gen. George G. Meade, held a nearly parallel course through Maryland into s. Pennsylvania. The Confederate advance penetrated Pennsylvania almost to Harrisburg; but the two main opposing armies met at Gettysburg. The Confederate army was defeated (1863, July 1-3) after a terrific struggle, with great loss; in this battle it lost much of its *prestige*, and was never again what it had been. Then for a time the opposing hosts confronted each other across the Rappahannock, having come back once more to nearly the same relative positions which they occupied at the beginning of the war; but greatly changed was the relative situation of the two contestants both in war resources and in financial ability. The blockade of the Confederacy's ports was almost perfect; the railroads of the north, and of the south as well (for all the great southern lines, except those of Georgia, were now held by the Union armies), were at the service of the national government for rapid transportation of troops; similarly with the telegraph lines: and among the many important developments of the art of war introduced during this war, not the least was the systematic use of these two agencies. Two army corps comprising 23,000 men, with the needful *material*, were transferred from Washington to Chattanooga, 1,200 m., in 7 days (1863); and such transfers were not rare. Conscription was resorted to by the Confederacy to fill its ranks; the Federal government enacted a conscription law first 1863. The enforcement of the law provoked

bloody and frightful riots in New York in July, on the part of the lower classes of southern sympathizers in that city; but opposition was put down promptly, and the law was executed throughout the country: the several states, however, were left free to fill the draft by means of volunteers stimulated by offer of large bounties; drafted men also were allowed to hire and present substitutes.

Ulysses S. Grant was appointed lieutenant general early in 1864, and intrusted with command of all the United States armies. Leaving Sherman at Dalton, Ga., to confront Gen. Johnston, Grant repaired to Washington to meet Lee. Crossing the Rapidan, he entered the Wilderness early in May with an army variously estimated, but much larger than that of Lee; simultaneously 30,000 men were dispatched up the James river under Gen. Butler, to co-operate. After 2 weeks of hard fighting (May 5-18) and 4 days at North Anna (23-27), the further advance of the Army of the Potomac on Richmond was stoutly contested at Cold Harbor, near the Confederate capital. An attack in force was repulsed with serious loss to the Union arms; and Grant, recognizing the impregnability of Lee's position there, sought a weak spot elsewhere in Lee's lines on that side of Richmond, but found none. Crossing the James and reaching Petersburg, where he was within striking distance of the southward railroad lines on which Lee depended for his supplies, Grant found opposed to him there a strong Confederate army, which stayed his advance to the railroads. To weaken the Union army before him by creating a necessity for detaching a part of it for the defense of Washington, Lee now sent Early with a force up the Shenandoah valley to threaten the national capital (July). But Grant did not wait for the appeal from Washington: he detached a command under Gen. Philip H. Sheridan to meet Early, whose army was crushed by Sheridan at Cedar Creek (Oct.).

The army commanded by Sherman in n.w. Georgia advanced against Gen. Johnston 1864, May 5, the same day in which Grant crossed the Rapidan. Johnston retired slowly before Sherman till he reached Atlanta in the middle of July and Johnston was superseded in the command July 17 by Gen. Hood, who was expected to assume an aggressive attitude. Hood made three furious attacks on Sherman, in each suffering defeat. At length, his lines of communication being cut, he had to retreat, and Sherman's army entered Atlanta Sept. 2. Hood then countermarched, and headed his force for Tennessee, hoping that Sherman would start in pursuit of him. But Sherman sent Gen. Thomas back to Nashville to confront Hood—taking command of the forces there and of reinforcements ordered from the west. Hood's army was routed by Gen. Thomas (Dec.). Gen. Sherman had after the taking of Atlanta 60,000 veteran troops and, far as he was in the interior of the Confederacy, no organized

Confederate force stood between his rear and Lee's army, for Hood's army never rallied after its defeat at the hands of Gen. Thomas. After the capture (Aug. 5) of Mobile by Farragut, only one Confederate seaport, Wilmington, N. C., remained to the enemy. 1864, Nov. 16, Sherman sent his wounded north, and began the 'march through Georgia to the sea.' He destroyed the railroad and telegraph line by which he had kept communication with the north, and, marching eastward, reached Savannah Dec. 12. Savannah was taken Dec. 20. He moved n. from Savannah 1865, Jan. 15; and reaching Fayetteville, N. C., he there rested, holding in check the force assembled under Gen. Johnston, and thus preventing it from joining Lee.

In the beginning of Mar. (1865), Sheridan, with a cavalry force, moved from the valley of the Shenandoah, and joined Grant before Petersburg. Grant was working his lines steadily around Petersburg on the s., so compelling Lee to defend a longer line with a reduced force. Grant put Sheridan in command of the Union left; and Sheridan, advancing to Five Forks, destroyed the Southside railroad, another of Lee's lines of supply. This movement made necessary a further extension of Lee's defense-line. When the line had been duly extended, and consequently weakened at every point, a general advance of Grant's army was made. Petersburg was taken; Richmond was occupied by the victors; President Jefferson Davis and the whole *personnel* of the Confederate government fled to North Carolina; Lee was surrounded and compelled to surrender unconditionally Apr. 9. No prisoners were held by Grant, officers and men alike being permitted to go their ways on parole, and even to take their horses with them—Gen. Grant remarking that they 'would need them for their spring-plowing.' He gave them assurance that they should not be disturbed by the United States government so long as they were true to their parole and obeyed the laws. The surrender of Johnston to Sherman followed Apr. 26. The war was ended.

[Throughout this historical sketch, see for further details the respective titles of principal persons, places, battles, etc., mentioned herein. See also CIVIL WAR.]

The war was scarcely ended when 800,000 men of the national armies were paid off. During the war the number of men called for by the United States government was 2,759,049; the number actually furnished was 2,653,062. Of colored troops there were 186,097. The state of New York, with population less than 4,000,000, sent 223,836 men into the field. There was an annual waste of one-third, half of which was by wounds in battle. The Federal losses during the war were estimated at 316,000. In the Union armies there were a little more than 1,000,000 men 1865, Mar. In 1864 the Confederate army consisted of 20,000 artillery, 128,000 cavalry, 400,-

951 infantry; the entire available force enrolled did not exceed 700,000. The Confederate losses are said to have amounted to 300,000. The United States debt, incurred on account of the war, reached the maximum, $2,845,907,626.56, 1865, Aug. 31; besides this, about $800,000 of revenue had been expended. States, counties, towns, etc., also expended large sums and incurred heavy obligations for war purposes. The value of property destroyed in the south (apart from the value of the liberated slaves, $2,000,000,000) cannot be estimated; probably the total loss and expenditure was not less than $8,000,000,000. To this add the expenditure on account of pensions. (See PENSIONS AND PENSIONERS.)

1865, Mar. 4, Abraham Lincoln entered on his second term of the presidency; the vice-president was Andrew Johnson, of Tennessee. On Apr. 14, while the north was rejoicing over the capture of Richmond and the surrender of the Confederate armies, the president was assassinated at a theatre in Washington, by John Wilkes Booth, an actor; while an accomplice attacked and nearly killed William H. Seward, secretary of state. The assassin was pursued and killed, and several of his accomplices were tried and hanged. Andrew Johnson became president. Jefferson Davis and the members of the Confederate government were supposed to be privy to the assassination of President Lincoln, and large rewards were offered for their apprehension. Davis was captured in Georgia, and placed in Fortress Monroe, but was released without trial 1867, May. An amendment to the constitution forever abolishing slavery in the states and territories of the Union was declared ratified by two-thirds of the states 1865, Dec. 18. The vast change in the organization of the republic made by this new fundamental law was completed by the 14th and 15th amendments, passed 1868 and 1870, which gave to the former slaves all the rights and privileges of citizenship. But the reconstruction of the Union presented a difficult constitutional and practical problem. Before President Lincoln's death state governments had been organized by the executive of the United States in Virginia, Tennessee, Louisiana, and Arkansas, and amnesty was assured to all citizens of the Confederacy who would take oath to support the Federal government and the abolition of slavery; state governments set up by the acts of such voters were recognized as lawful and regular. But the situation was materially altered after the assassination of Abraham Lincoln. Then congress, never content with the terms of settlement proposed by Lincoln, favored different plans of reconstruction, all of them exacting from the states that had revolted conditions far more stringent than those required by President Lincoln. The 7th article of Gen. Sherman's 'memorandum' to Gen. Joseph E. Johnston was ignored as being plainly *ultra Vires:* in that article Gen. Sherman, who represented

himself as being 'fully empowered to arrange terms for the suspension of hostilities,' promised to the officers and men of Johnston's army and to all the Confederates then in arms 'a general amnesty,' on condition of disbandment of the Confederate army. President Andrew Johnson, during the months intervening between his succession to the presidency, 1865, Apr., and the assembling of congress in November, reorganized the governments of all the states of the late Confederacy, the condition precedent being their acceptance of the 13th amendment of the United States constitution. But congress refused to receive them back on such terms, yet made one exception in favor of the state government of Tennessee: that state was admitted to all the rights of statehood 1866. The legislatures of the states recognized by the president at once began to enact contract and vagrancy laws, under which the freedmen would be kept in a state little different from slavery. The president and congress were soon in irreconcilable conflict. The president vetoed acts passed by congress, such as the Freedmen's Bureau Act, the act admitting Nebraska to the Union (1867), the Tenure of Office Law (whose sole purpose was to tie the hands of the then chief executive), and the Reconstruction acts but congress in every case overrode the presidential veto. By the Reconstruction acts the states of the fallen Confederacy (Tennessee excepted) were made military districts, the commanding generals of each of which was empowered to deny to the state government the exercise of any powers which might be used to the prejudice of the freedmen. The state governments themselves were to be merely provisional, until legislatures and executive officers chosen by their whole citizenship—without regard to race, but with exclusion from suffrage of certain leaders in the secession movement—should recognize the principle of manhood-suffrage and ratify the 14th amendment to the Constitution. (See CONSTITUTION OF THE UNITED STATES.) In nearly all of the once rebel states these conditions were complied with, and governments set up mostly by the votes of the freedmen. The struggle between president and congress reached its height 1868, when, for having violated the Tenure of Office Law by removing Edwin M. Stanton from the war secretaryship, Andrew Johnson was brought to trial before the senate. The necessary two-thirds vote for conviction could not be obtained, and Johnson completed his term amid unceasing strife. The presidential election of 1868 was triumphantly won by the republicans, and Johnson was succeeded by Gen. Ulysses S. Grant 1869, Mar. 4. The states once forming the Confederacy had all, except Virginia, Mississippi and Texas, been admitted to the full rights of statehood 1868, June, and they voted in that election. The legislatures of those states were filled mostly with freedmen, and the chief executive offices by freedmen or by 'carpet-baggers'—i.e.,

white republicans from the north. The 15th amendment, having been ratified by a sufficient number of states, went into effect 1870. The three states which had rejected the earlier terms of readmission to the Union were now required not only to comply with these terms, but, further, to ratify this amendment. Not until 1871, Jan., were all the states represented in congress.

In 1867 the United States acquired by purchase the whole of Russian America (see ALASKA). In 1872 the Alabama (see ALABAMA, THE) Arbitration gave its decree in favor of the United States; and the San Juan boundary dispute with Great Britain was settled on the same side by the emperor of Germany. The outrages of a secret organization known as the Ku-Klux Klan, in the southern states, necessitated the passing of an act, 1871, giving cognizance of such offenses to the United States courts.

The year 1876, memorable in the annals of the republic as the hundredth anniversary of the Declaration of Independence, was celebrated by a great Centennial Exhibition at Philadelphia. The presidential election of the same year was of more than usual interest. Gen. Ulysses S. Grant (q.v.), chosen president 1869, had been re-elected 1873. When the result of the keenly contested election toward the close of 1876 began to be made known, it seemed at first favorable to the election of Samuel J. Tilden, the democratic candidate. But many of the returns from some southern states were disputed, and for months there was intense excitement. At last a special tribunal, selected from the senate, the house of representatives, and the judges of the supreme court, was appointed to examine the election returns: the result was that Rutherford B. Hayes, the republican candidate, was declared to have been elected president, and inaugurated 1877, Mar. 4—A period of great commercial depression, not confined to the United States, reached a height in 1877, and was accompanied by alarming difficulties between labor and capital. A measure was passed 1878, in spite of the president's veto, making silver a legal tender equally with gold, though silver was then 11 per cent. less in value. A marvellous recovery in trade rendered comparatively easy, 1879, the resumption of specie payments. Antipathy to the Chinese immigrants in the Pacific states raised, about this time, a violent agitation. The wheat crop and exportation 1882 and 84 were unprecedentedly large; subsequent years showed decrease. In 1879 there was, for the first time since the Civil war, a democratic majority in both houses of congress; but the presidential elections in 1880 gave a large majority for the republican candidate, Gen. Garfield, though the 'Solid South' voted for Gen. Hancock, the democratic candidate. Garfield (q.v.), installed 1881, Mar. 4, died in September of that year from the effects of an assassin's shot. Thereupon the vice-president, Gen.

Arthur, succeeded to the presidency. The continued development of the United States, as shown in the returns of the census 1880, led to an almost embarrassing surplus of revenue, and was held by many to call for a revision of the tariff. There was, however, stagnation in several departments of industry 1882-85. At the election of 1884 the candidates were James G. Blaine, republican, and Grover Cleveland, democrat. Cleveland (1885-89) was the first democratic president elected since Buchanan: he owed his election to a strong defection of republicans from their party, through hostility to James G. Blaine. Toward the close of his administration, Cleveland, in a message to congress, strongly advocated the policy of reducing the tariff rates. On an appeal to the people for re-election on this issue he was defeated by his republican competitor, Gen. Benjamin Harrison (grandson of the first President Harrison), who received the suffrages of 233 presidential electors, Cleveland receiving only 168; though the votes returned for the democratic (Cleveland) electors exceeded those for the republican (Harrison) electors by 98,017, the total democratic vote being 5,538,233, and the total republican vote 5,440,216. President Harrison's administration was supported by republican majorities in senate and house of representatives. The most memorable event of United States history in Harrison's term of office was the passing of the McKinley Tariff Act: under this law a degree of commercial reciprocity was arranged between the United States and several other countries. The wheat harvest 1891 was of unprecedented amount. Unfortunate disputes with Italy and with Chili—that with Chili seeming at one time likely to eventuate in war—were happily settled.

In the presidential campaign of 1892 the republican candidates for president and vice-president were Benjamin Harrison and Whitelaw Reid; the democratic, Grover Cleveland and Adlai E. Stevenson; the populist, James B. Weaver and James G. Field; the prohibitionist, John Bidwell and James B. Cranfill; and the social labor, Simon Wing and Charles H. Matchett. The election resulted in the choice of the democratic candidates, who received 5,554,685 popular votes, a plurality of 382,352, and 277 electoral votes. The 53d congress (1893-5) opened with 44 democrats, 38 republicans, and 3 populists in the senate, with 3 seats in doubt; and with 220 democrats, 126 republicans, and 8 populists in the house, with two members to be elected in Rhode Island. The second administration of President Cleveland had several notable features. At its beginning the president withdrew from the senate the draft of a projected treaty with Hawaii, providing for the annexation of the islands to the United States; sent a special commissioner to investigate the facts concerning the revolution in Honolulu, the dethronement of the queen, and the establishment of a pro-

visional government; and vainly endeavored to have congress right what he pronounced a wrong done the monarchy in the name of the United States. The opposition to the president developed in this case, not only by his political opponents, but by a strong faction in his own party, continued to the close of the term, and was at no point more effective than in thwarting the various attempts of the administration to carry out financial legislation. A new tariff bill, bearing the name of Chairman Wilson of the house committee on ways and means, was introduced 1893, Dec. 19; passed in greatly amended form by the senate in 1894, Aug. 13; and became a law without the approval of the president. In 1895, Apr., the United States supreme court declared two of the income tax provisions unconstitutional, and upheld the remainder, and May 20 following, on a rehearing, declared the whole measure unconstitutional. A new treaty with China was concluded 1894, Mar. 17, and a commercial and reciprocal treaty with Japan, Nov. 22 following. Amnesty and pardon were proclaimed to all persons convicted of polygamy, 1894, Sep. 27. The president, as arbitrator, decided the boundary dispute between Brazil and the Argentine Republic in favor of the former 1895, Feb. 6. The services rendered by the United States representatives in China and Japan during the war between those countries, were acknowledged by the respective emperors in autograph letters to the government. In 1895, Dec., the president called the attention of congress to the boundary dispute between Great Britain and Venezuela; and later laid before that body the correspondence between the United States and British governments on the subject, and recommended the appointment of a commission to determine the divisional line in dispute. The message created large excitement throughout Europe and America; congress granted the authority; and the president appointed the commission 1896, Jan. 1. This action precipitated fears of serious international trouble, and both houses of congress adopted liberal initial measures for the defense of the country. The elections to the 54th congress (1895-97), resulted in the political composition of the houses as follows: senate, 45 republicans, 39 democrats, 6 populists —total, 90; house, 249 republicans, 103 democrats, 6 populists, 1 silver, 1 vacancy—total, 360. In 1894, Jan., Secretary Carlisle, of the treasury department, issued a call for the purchase of $50,000,000 of 5 per cent. bonds, for the purpose of retaining the gold reserve, and received $58,660,917 in gold. In November following, a second call for $50,000,000 brought subscriptions aggregating $178,341,150, and the amount accepted at 117.077 was $58,538,500. Extraordinary withdrawals of gold led the president, 1895, Jan. 28, to ask authority of congress for the secretary of the treasury to issue bonds at a low rate of interest to maintain the reserve and redeem notes

issued for the purchase of silver; but congress refused to grant the authority. The secretary then signed a contract with a syndicate to supply the government with 3,500,000 oz. of standard gold coin at the rate of $17.80 per oz., for 30-year 4 per cent. bonds, on the condition that one-half of the coin should be obtained and shipped from Europe. Pending the execution of the contract, the president again asked congress for authority to issue 3 per cent. gold bonds, pointing out that more than $16,000,000 would be saved in interest by such bonds; but congress again withheld its sanction. The contract was executed, and bonds aggregating $62,315,000 were sold for a little more than $65,000,000 in gold. Again, 1896, Jan. 5, the secretary was obliged to ask proposals for $100,000,000 of 30-year 4 per cent. bonds, and the responses covered $568,269,850, at prices ranging from par to more than 120. On the allotment, individual bankers and bidders were given $62,088,650, and a syndicate $37,911,350. For the presidential campaign of 1896, the republican party adopted a sound-money, or gold, platform, and nominated William McKinley, of Ohio, for president, and Garret A. Hobart, of New Jersey, for vice-president; the democratic party pronounced for the unlimited coinage of silver at 16 to 1, and the reorganization of the United States supreme court, and nominated William J. Bryan, of Nebraska, for president, and Arthur Sewall, of Maine, for vice-president; the populist party endorsed the democratic platform and candidate for president, and nominated Thomas E. Watson, of Georgia, for vice-president; the prohibition party nominated Joshua Levering, of Maryland, for president, and Hale Johnson, of Illinois, for vice-president; the social labor party nominated Charles H. Matchett, of New York, for president, and Mathew Maguire, of New Jersey, for vice-president; and the national silver party endorsed the democratic nominations. The action of both the republican and democratic national conventions on the money question caused much dissatisfaction in each party. The few silver delegates to the republican convention withdrew in a body after the nomination; and the sound-money democratic leaders held a convention and, Sep. 3, nominated John M. Palmer, of Illinois, for president, and Simon B. Buckner, of Kentucky, for vice-president. McKinley was elected, receiving 271 electoral and 7,102,447 popular votes, and a plurality of 597,486, up to that time the largest since Grant's election in 1872. See PRESIDENT AND VICE-PRESIDENT, ELECTIONS OF.

The year 1898 was but a few months old when the United States found itself at war with Spain. Brought about by hostile demonstrations against Americans in Havana, the publication of a letter written by Señor de Lome, Spanish minister at Washington, which contained insulting allusions to President McKinley, and the ...

struction of the United States battleship *Maine,* while on a friendly visit in the harbor of Havana, and the loss of 266 American lives, members of her crew—all these events led to the Spanish-American war, which was begun by Spain, 1898, Apr. 21, when she returned the American minister at Madrid, Gen. Woodford, his passports.

Another cause, and this led to the decision of congress to intervene in Cuban affairs and to grant the insurgents belligerent rights, was Spain's inability to subdue the rebellion and her declining to recognize the independence of the island. When Captain-General Weyler resigned 1897, Oct. 6, and General Blanco succeeded him, an attempt was made to give Cuba a shadowy form of autonomous government and amnesty was proclaimed. But the insurgents paid no heed to Spanish offers, which were deemed insincere, and fighting continued. The awful results of General Weyler's orders to lay the plantations bare, burn the dwellings of the people, and drive them into military zones, where they died from starvation and disease, horrified the American people, and congress was urged to interfere for the sake of humanity.

Owing to the anti-American demonstrations by Spanish volunteers at Havana between Jan. 15 and 20 the governor-general found it necessary to place a military guard around the United States consulate. This caused intense excitement in the United States and the battleship *Maine* was dispatched to Havana harbor Jan. 24 ostensibly on a friendly visit, but really to afford protection to American citizens in case of necessity.

Following this came the publication of De Lome's letter (Feb. 9) maligning President McKinley, which resulted in his resignation and recall, and the blowing up of the *Maine* (Feb. 15) in Havana harbor. On receipt of the news public feeling throughout the United States was thoroughly aroused. Congress immediately voted $200,000 for the employment of divers to investigate the cause of the destruction of the vessel and to raise her if found practicable. A court of inquiry to find out the cause of the disaster was appointed Feb. 18, and began its investigations at Havana three days later. Foreseeing the result of the investigation and the strained relations likely to arise between the United States and Spain, Consul-General Lee advised all Americans not necessarily detained in Cuba to leave for home at once. This action, together with the jealous care with which he protected American citizens and interests, and his intense patriotism, led to a Spanish demand for his recall, which was made March 5 and promptly refused.

Strong evidence having been obtained by the court of inquiry that the *Maine* was blown up by a submarine mine, a wave of indignation at what was believed to be an act of treachery swept over the United States. The court held session in Havana for four weeks, and reached

an unanimous decision March 21 that the loss of the *Maine* was not in any respect due to fault or negligence on the part of any of the officers or members of her crew; that the ship was destroyed by the explosion of a submarine mine, which caused the partial explosion of two or more of her forward magazines; and that no evidence has been obtainable fixing the responsibility for the destruction of the *Maine* upon any person or persons.

By this time public opinion was fully aroused. Congress had previously adopted unanimously a resolution establishing a defense fund of $50,000,000, and on March 29 resolutions declaring war on Spain and recognizing the independence of Cuba were introduced into both houses, and the House of Representatives passed a resolution favoring United States intervention into Cuban affairs April 13. In the meantime Consul-General Lee, who had recalled all the American consuls on the island, left Havana with a large number of American residents. In Spain mobs made hostile demonstrations before the American consulates at Barcelona, and Malaga, breaking the windows of the buildings and smashing the furniture. These riots continued till the eve of the withdrawal of the American minister April 21, when actual hostilities began. On the following day the North Atlantic squadron sailed from Key West under Admiral Sampson to blockade all Cuban ports. On its way the gunboat *Nashville* captured the first prize of the war, a Spanish vessel, the *Buena Ventura.*

A call for 125,000 volunteers was issued by President McKinley April 23 and a proclamation announcing the war was made to the neutral powers. Coal was declared contraband of war by Great Britain April 21, and this was followed on the 24th by her declaration of neutrality. The other European nations, with the exception of Germany, also declared themselves neutral.

About this time Commodore Dewey (q.v.), who had received instructions from Washington to capture or destroy the Spanish Pacific fleet, set sail from Hong Kong, and arriving off Manila Bay April 30 forced his way past the batteries of Corregidor island and on May 1 sank the Spanish fleet off Cavité, a suburb of Manila (q.v.), silencing the forts and capturing the arsenal. For this daring deed Dewey (q.v.) was made a rear-admiral ten days later. Two months later another Spanish fleet under the command of Admiral Cervera, which arrived at Santiago de Cuba (q.v.) May 19, was sunk by the North Atlantic squadron under Admiral Sampson, with Commodore Schley second in command.

A second call for volunteers numbering 75,000 men was issued by the president May 25, and on June 10 the war revenue bill was passed by congress, becoming operative shortly after. On the 14th an army of invasion under General W. Shafter (q.v.), consisting of 16,000 men, sailed from Key West for Santiago, and arrived at

Daiquiri, Cuba, June 20. Active military operations were begun, and after several brilliant engagements (see ROUGH RIDERS; SANTIAGO) in which the Spaniards under Gen. Pando were defeated, the surrender of Santiago was demanded and made July 17. On the 20th Gen. Leonard Wood was appointed military governor of the city.

The last naval engagement on the Cuban coast occurred July 21, when four United States warships entered the harbor of Nipe and captured the port after a furious bombardment.

Another military expedition was organized by the commanding general of the United States army, Nelson Miles, and set sail for Porto Rico under his charge. Landing at Guanica on July 25 the army attacked the town, which surrendered quickly, as did also Ponce on the 28th. Plans having been made for a concerted attack of San Juan, orders to advance were impending when news was received of the cessation of hostilities. On July 26 the French minister on behalf of the Spanish government asked for terms of peace, and three days later these were stated by President McKinley.

In the meantime several military expeditions had been prepared and set sail for the Philippines, where the Spaniards were inclined to offer resistance. Commanding one of these Gen. Wesley Merritt landed at Cavité, Manila, July 29 and lost no time in attacking the Spaniards. Jointly with Dewey he advanced on Manila, which surrendered after a short bombardment by the fleet and a brisk land fight which threatened to turn into an assault, on Aug. 13.

Secretary of State Day, Senator Davis of Minnesota, Senator Frye of Maine, Whitelaw Reid of New York, and Senator Gray of Delaware, having been appointed by the president as peace commissioners Sept. 9, set sail for Paris, where the commission were to meet the Spanish appointees Sept. 17, and held their first session Oct. 1.

For thirty days the Spanish peace commissioners contended earnestly for the assumption of the Cuban debt by the United States without avail. On the 31st the American commissioners presented the demand of the United States for the Philippines, which was eventually accepted on the payment of $20,000,000. The treaty was concluded and signed at 8:45 p. m. Dec. 10, 1898.

In 1900, Bryan and McKinley were again candidates of their respective parties, and the latter was elected, with Theodore Roosevelt for vice-president. In September, 1901, the president was shot by an anarchist at Buffalo, and Mr. Roosevelt became president. In 1904 the republicans nominated Mr. Roosevelt, and the democrats named Alton B. Parker of New York, who was overwhelmingly defeated. Mr. Roosevelt's administration of national affairs was marked by a strenuosity and vigor such as the country had never known; nothing was too insignificant for the attention of the executive, and only

in the remote future can its results be fully determined. It may be said that every effort was made to enforce the law against illegal combination, which, while not successful in punishing any person directly responsible, certainly did much to awaken the conscience of the people, and produce a healthier conduct of business both public and private. Careful observers of market conditions had been prophesying the imminence of commercial disaster, but it was hardly looked for so early, when in October, 1907, several large enterprises went into the hands of receivers, and the gloom of a panic settled upon the business world. The chief cause of the trouble was the revelations of jobbery and shameful performances in high-finance shown to have characterized several insurance and transit corporations, which, while not fully wrecking the concerns, caused the investing world to lose confidence, with the usual results in the way of business upheaval.

The most conspicuous work of the seven years of Mr. Roosevelt's administration was the beginning of the construction of a canal across the isthmus of Panama. This matter had been in the minds of American publicists for many years, when an incident of the war of 1898 brought home to the mind of the average citizen the extreme importance of a shorter route between the eastern and western seaboards. This was the trip of the warship *Oregon* from San Francisco around Cape Horn. The anxiety with which her voyage was marked, did more than years of argument to convince the people that no time should be wasted in bringing such a work to a conclusion, and when President Roosevelt took up the task he had the country back of him. The negotiations and necessary preliminaries are detailed elsewhere (see PANAMA CANAL), but when Mr. Roosevelt retired from the presidency in 1909, every indication promised the completion of the water way before 1915.

The election of 1908 found Mr. Bryan once more the democratic nominee, his opponent being Wm. H. Taft, who had been the most active man in Mr. Roosevelt's cabinet, and the most conspicuous of the public men of the day next to the president himself. Mr. Taft was elected, and, on assuming the duties of his office, called about him a representative cabinet, its membership being confined neither to the dominant party nor to any one section, and the first months of his administration gave promise of the introduction of a safe, sane and conservative administration. Almost his first public act was to call an extra session of congress to revise the tariff, and in certain lines heavy reductions were made. As soon as this matter was settled, business began to revive in earnest, and the gloom and doubt that had covered the country since 1907 passed away, and a new era of prosperity made its appearance.

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UNITED STATES INDIAN TRAINING AND INDUSTRIAL SCHOOL: at Carlisle, Pa. It was established on the present site in 1879; but its real beginning was in 1875, when 74 Indians were brought as prisoners of war to Fort Marion, Saint Augustine, Fla. When put to work at the fort they proved intelligent and trustworthy, and their skill as workmen aroused the interest of some of the women of Saint Augustine, who established a school for them and taught them English. In 1878, when their term of confinement was over, 22 asked to stay in the East to attend school, 17 of whom were placed at Hampton Institute; Capt. R. H. Pratt of the United States army was then authorized to bring 50 more Indians from the Dakota reservation to Hampton. He soon found that a separate school for the Indians was desirable, and the abandoned army post at Carlisle was assigned for the uses of a school in 1879. In October of

that year he brought the first Indian pupils to Carlisle. The aim of the school has always been to prepare the Indians to take part in the life of a civilized community as citizens on an equality with other citizens, and thus to free them from especial and separate supervision. The courses offered are of elementary and secondary grade, and are grouped about four central subjects, the English language, history and literature, science, and form and number (including geometry and algebra). There are also excellent music and art departments. A normal deparment was organized in 1894 and provides instruction in psychology (elementary), pedagogics, history of education, and methods of teaching sloyd, with practice work. The industrial work is a prominent feature, half the school day being devoted to some productive industry. Instruction and practice is given in carpentry, blacksmithing, painting, harness-making, tinsmithing, shoemaking, laundry work, hospital and nurse work (including special course in bread-making), sewing, laundry work, hospital and nurse work, farming and dairying. Another important part of the work is the systematic physical training, gymnastic classes being arranged for boys and girls in all grades; athletic sports are also encouraged, and the football team has a national reputation for excellent playing. The most distinctive feature of the school is the 'outing system,' by which the school requires all its students to spend at least one year in some white family under the supervision of the school. During the winter they attend the public school in their neighborhood, and when not in school receive regular wages for work on the farm or in the home; a portion of these wages is placed in the school bank and draws interest. This system, which has been in force since the beginning of the schools, has proved eminently successful; the Indians have been pleasantly welcomed in the homes to which they go, and have proved themselves, as a rule, helpful and congenial members of the family. Over 800 pupils are sent out every summer, and about half that number remain out every winter. The aim of this system is to enable the Indians to gain direct, personal experience in self-support by honest work, and an insight into the responsibilities and amenities of civilized family and institutional life in its best and most attractive forms. A weekly paper, *The Red Man and Helper,* is printed in the school shop by Indians. The school is under the control of the Indian Office of the United States government, and is supported by government appropriation.

UNITED STATES OF BRAZIL. See BRAZIL.

UNITED STATES OF COLOMBIA. See COLOMBIA.

UNITED STATES OF MEXICO. See MEXICO.

UNITED STATES OF VENEZUELA. See VENEZUELA.

UNITED STATES MILITARY ACADEMY.

UNITED STATES MILITARY ACADEMY: national institution at West Point, N. Y., for education of officers for the regular army; organized 1802. Candidates for admission must be 17-22 years old, at least 5 ft. in height, of good moral character, and free from anything that would render them unfit for military service. They must pass a severe medical examination, and an examination in reading, writing, orthography, arithmetic, elements of English grammar, descriptive geography, and the history of the United States. The course is 4 years, the pay is $609.50 per annum; an oath of allegiance is required of each cadet, also a pledge to serve the United States for 8 years after graduation unless sooner discharged. Admission is secured by appointment—each congressional district and territory and the District of Columbia being entitled to one cadet, and the president of the United States having the right to appoint ten cadets annually from the country at large. Appointments from states and territories are made by the secretary of war on recommendation of congressional representatives and delegates; and presidential appointments are usually of sons of dead or distinguished officers of the army or navy or of other officials. In recent years the practice has become general for a representative or delegate to recommend to the secretary of war for appointment the boy who attains the highest ratings in a competitive examination held for the purpose and open to all eligible boys in the district.—The curriculum comprises the departments of tactics; civil and military engineering; natural and experimental philosophy; mathematics, history, geography, and ethics; chemistry, mineralogy, and geology; drawing; modern languages; law; practical military engineering, military signalling, and telegraphy; and ordnance and gunnery. The professors in the various departments are usually appointed from civil life, and receive the pay of lieutenant-colonel in the army in the first 10 years of service, and that of colonel afterward; and the assistant professors and instructors are young officers appointed from the army, who receive the army pay of their respective grades. The chief executive is officially known as the superintendent, and while holding the office has the rank and pay of a colonel of engineers, whatever his army grade may be. As the academy was originally established as a school of engineering, its superintendents for many years were appointed from the corps of engineers; but since 1866 the office of superintendent has been open to all branches of the service. The second executive officer is the commandant of cadets, who has the rank and pay of a lieutenant-colonel of engineers. The annual examinations are held in the presence of a 'board of visitors,' comprising 7 members appointed by the president, 2 United States senators appointed by the president of the senate, and 3 representatives appointed by the speaker of the house.

The graduating class is divided into 3 parts when practicable, the first comprising those of exceptionally high standing, who are privileged to select the branch in which they wish to serve; the second, those recommended for commissions in any branch excepting the engineers; the third, those recommended for any branch excepting the engineers and artillery. The graduates are commissioned brevet 2d lieutenants and 2d lieutenants by the president according to the recommendations of the board of visitors. Nearly 300 of the 4,000 graduates of West Point have become general officers. Every notable battle during the Civil war, with two exceptions, was led by graduates of the Military Academy. Among those who chose careers outside of the army at some time after graduation 1 served as president of the United States (U. S. Grant), 4 held cabinet offices, 16 served as state or territorial governors, and 46 have been presidents of universities and colleges. A number of new buildings, including Cullum Memorial Hall, have been erected since 1899, at a cost of $6,000,000. The military reservation covers about 2,400 acres. Neither the total value of the grounds and buildings nor of the scientific apparatus, with which each department has been liberally supplied, has ever been estimated. Under the 1880 census the number of cadets authorized by law was 347; under that of 1890 the number was increased to 371; under that of 1900 to 481. The present maximum number is 533. Owing to resignations, discharges, and other causes, the number present for duty is generally about 18 per cent. below the maximum.

UNITED STATES NATIONAL MUSEUM: a national depository for scientific and historical collections under the administration of the Smithsonian Institute (q.v.), located at Washington, D. C. The beginning of the museum was Smithson's cabinet of minerals, and other collections gathered by exploring expeditions, which had been placed under the charge of the Smithsonian Institute by the act establishing it in 1846. The name of United States National Museum was not adopted until 1876, when the Smithsonian Institute added to the collections already made the exhibits prepared to illustrate the resources and ethnology of the United States at the Centennial Exhibition, together with a large amount of material presented by 34 foreign nations. In 1879 congress appropriated $250,000 for a museum building; but this has for some time been inadequate for the proper housing of the collections, and a new building was provided for in 1903 by the appropriation of $3,500,000. The chief means of adding to the collection are by the specimens gathered by government explorations and surveys, by exchanges, by gift, and by limited purchases provided for in the congressional appropriation. The museum is under the general direction of the secretary of the Smithsonian Institute, and under the special

charge of an assistant secretary and curators, appointed by the secretary; and receives an annual appropriation from the government. Its collections are naturally best for matters relating to North America; the material illustrating the arts and occupations of the American Indians and the fisheries of the United States is particularly valuable; and the historical collections containing personal relics of famous Americans are interesting. The Museum publishes *Proceedings* and an *Annual Report*, containing scientific articles describing or illustrating the collections; aid is also given to students in using the collections for purposes of scientific research.

UNITED STATES NAVAL ACADEMY: national institution for education of officers for the United States navy; at Annapolis, Md., established by George Bancroft, when secretary of the navy, and opened 1845, Oct. 10. The site and buildings of Fort Severn, on Annapolis harbor, at the mouth of the Severn river, were transferred by the war department to the 'Naval School,' as it was originally called. Prior to the establishment of the institution, midshipmen were instructed aboard ship by the chaplain, or, when they could be spared from ship-duty, by schoolmasters ashore: and promotions were made on satisfactory examinations at the United States Naval Asylum in Philadelphia. The original purpose of the school was to gather the midshipmen on shore duty or leave of absence, and give them special instruction in those practical studies with which neither naval chaplains nor land school-masters were expected to be familiar. In 1849 a board of officers was convened to reorganize the school and make it for the navy what the United States Military Academy was for the army. As results, the name of the institution was changed to the present form, the course of study was fixed at 4 years, a war-vessel was assigned to the institution to increase the practical character of the curriculum and to afford means of an annual summer cruise, and the entire course of instruction was revised and enlarged. Gradually congress has increased the departments of study; provided models, museums, work-shops, mechanical apparatus and tools, philosophical, chemical, and astronomical appliances, and a great variety of practical aids; and lengthened the duration of the course of study to 6 years, as at present, of which 2 are spent at sea. Candidates for admission must be 14-18 years old; at least 5 ft. in height; of good moral character and sound physical condition; must undergo a physical examination, and an examination in algebra, arithmetic, English grammar, geography, United States history, reading, writing, and spelling; must take the oath of allegiance to the federal government; and must agree to serve the government for 8 years unless sooner discharged. Successful candidates receive appointments as naval cadets; are obliged to provide themselves with various articles of attire, and class-

room, mess, and dormitory appurtenances, now aggregating in cost $200; have $60 per annum retained from their annual pay to meet the cost of their graduation outfit; and are allowed $500 per annum from the time of their appointment till their graduation, but have only a nominal control over the money. After leaving the academy, and while at sea in other than practice ships, their pay is $950 per annum. Appointments to the Naval Academy are made in the same manner and to the same number as to the United States Military Academy (q.v.). In the academical year 1895-6 the curriculum comprised the departments of seamanship, naval instruction, and naval tactics; ordnance and gunnery; astronomy, navigation, and surveying; steam-engineering; mechanics and applied mathematics; physics and chemistry; mathematics; English studies, history, and law; modern languages; mechanical drawing; physiology and hygiene; and boxing, fencing, swimming, and gymnastics. By act of congress, 1889, the academic board annually separates the 1st class of cadets, then entering their 4th year, into two divisions, as they may have shown special aptitude for the duties of the respective corps; and thereafter these cadets pursue a course of study specially prepared to fit them for service in the line of the navy, the marine corps, and the engineer corps. Chief executive officers are a superintendent, with lineal rank of captain, and 2 assistants; a commandant of cadets, with rank of commander, and 6 assistants; and a commandant of marines. Nearly all the professors and instructors are regular officers of the navy on 4-year details. There are 89 professors and instructors; 850 cadets, and 49,300 volumes in the library. In 1895 was commenced a new and improved plan of construction and reorganization of the school buildings at Annapolis. The plan as viewed from the sea front shows the cadet quarters extending 729 feet, flanked on one side by the armory and on the other by the boat house. These buildings are at right angles to the direction of the cadet quarters and are 428 feet long. Thirteen hundred feet in a n.w. direction, with the main line of buildings parallel to and facing the first group, is the academic building with the chemistry and marine engineering buildings on either flank. Between these two groups, facing the Severn River, is the auditorium and chapel, with the superintendent's house and the administration building on either side. The new buildings involved an outlay of over $8,000,000.

UNITED SYNOD OF THE PRESBYTERIAN CHURCH. See PRESBYTERIANISM.

UNITED SYRIANS. See SYRIAN CHURCHES.

UNITED WORKMEN, ANCIENT ORDER OF: a beneficial organization founded in 1868. There are 44 grand lodges, 5,500 subordinate lodges, and over 500,000 members.

UNITS, SCIENTIFIC: certain dimensions or quantities assumed as standards of measurement in scientific calculations: these are assigned in various departments. Some typical units are here noticed.

PHYSICAL AND MECHANICAL UNITS. — Fundamental scientific units, according to the system adopted by the Brit. Assoc., are based on three quantities, the *centimetre* (unit of length or space), the *gram* (unit of mass), and the *second* (unit of time): the system is named from these three terms, the C. G. S. system. The gram in this case represents the mass of one cubic centimetre of water, really 1·000013 gram. As every scientific unit is based on one or more of the factors of space, mass, and time, it is evident that its value regarded as a quality may be expressed in terms of one or more of them. For these purposes the symbols L for lineal space, M for mass, and T for time, are used. The expression of a quality in terms of L, M, and T gives its dimensions, and has no reference to its absolute size: thus the dimensions of a second or of an hour are the same, namely, the dimensions of time, T. But if for these symbols we substitute the centimetre, the gram, and the second, the dimensions give us the concrete values of any desired fundamental unit. The three fundamental bases of space, mass, and time being given, we may deduce therefrom other units.

Velocity is space traversed divided by the time required in traversing it. Its dimensions are L/T; the C. G. S. unit is one centimetre per second.

Momentum is mass multiplied by velocity: its dimensions are $M \times L/T$, or ML/T; the C. G. S. unit is one gram moving at the rate of one centimetre per second.

Acceleration is velocity acquired (or lost) in a second: its dimensions are $L/T \div T$, or L/T^2; its C. G. S. unit is one centimeter per second.

Force is mass multiplied by acceleration: its dimensions are $M \times L/T^2$, or ML/T^2; its C. G. S. unit is the force required to impart a velocity of one centimetre per second to a mass of one gram. It is termed the *dyne;* approximately equal to $\frac{1}{981}$ gram.

Energy is force exercised along a path in space: its dimensions are $ML/T^2 \times L$, or ML^2/T^2; its C. G. S. unit is the dyne-centimetre or erg—approximately equal to $\frac{1}{13562691}$ foot-pounds.

Work is identical with energy in its dimensions and units.

Density is the quantity of matter per unit of volume: its dimensions are mass ÷ volume or M/L^3; unitary density is that of distilled water at 3°·9 C.

Activity or *Power* is the quantity of work done per unit of time: its dimensions are $ML^2/T^2 \div T$, or ML^2/T^3; its C. G. S. unit is the *erg-second.*

The foregoing illustrates the *theory of dimensions* of fundamental or C. G. S. units. There are many other scientific units which may be termed practical units, of which the following are representative.

Thermal units are generally expressed in weight of water

raised one degree in temperature. Under this head are such units as the gram-degree C., the kilogram-degree C., the pound-degree C., or the pound-degree F.—indicating the quantity of heat required to raise the temperature of one gram of water one degree Centigrade, from 0° to 1°, and so on. The gram-degree C. is termed the 'smaller calorie;' the kilogram-degree C. is the 'calorie' proper.

Work and energy units are generally expressed in weight raised a certain height. Of this class are the kilogram-metre, the foot-pound, the gram-centimetre, etc. The last-named, a gram raised one centimetre, would be a C. G. S. unit, except that the erg is accepted in its place.

Power, Activity, Rate of doing work or Rate of expend ing energy, all which are virtually synonymous, are generally expressed in horse-power. The Brit. and Amer. horse-power is 33,000 lbs. raised one foot per minute.

These units may be reduced from one to the other among themselves by multiplying by the requisite factors. The classic factor is known as Joule's equivalent. He determined that one pound-degree F. was equal to 772 foot-pounds of mechanical energy: this constant is one expression for the mechanical equivalent of heat. The mechanical equivalent of heat may be expressed in other units: thus one gram-degree C. is equal to 42,353·5 gram-centimetres.

Thermo-chemical equivalents are the products of the chemical combining weights of substances by the kilogram-degree C. of heat produced by the combination of one gram of the substance in question.

Electro-chemical equivalents are the quantities of substances decomposed by one coulomb of electricity.

Electrical Units.—There are two classes of electrical units based on the C. G. S. system. One is called the *electro-static* class, of principally theoretical interest, based on the forces exerted between two quantities of electricity. The other is called the *electro-magnetic*, based on the forces exerted between two magnetic poles. The latter is the basis for the electrical units adopted by the Paris Congress of Electricians, 1871. There are five principal units, called C. G. S. units of resistance, units of electro-motive force, etc. Being unsuited for practical use, multiples of them are used in practice, and are called *practical units*. We describe here only the electro-magnetic units.

The C. G. S. unit of Current Strength is the strength of a current which, passing through a circuit one centimetre long, bent into the form of the arc of a circle of one centimetre radius, exerts a force of one dyne on a unit magnetic pole placed at the centre of the circle.

The C. G. S. unit of Quantity is equal to a current of one C. G. S. unit of strength lasting for one second.

The C. G. S. unit of Electro-motive Force (often written E. M. F.) is one by which, if a C. G. S. unit of quantity is multiplied, one erg will be produced.

The C. G. S. unit of Resistance is one which requires one C. G. S. unit of E. M. F. to produce in it one unit of current strength.

The C. G. S. unit of Capacity is possessed by a con-

denser when it will hold one C. G. S. unit of quantity when charged to one unit of E. M. F. potential.

The practical units are multiples of these. The following are their names and relations to C. G. S. units:

The unit of CURRENT STRENGTH is called the *Ampere:* it is equal to $\frac{1}{10}$ C. G. S. unit. It is produced by an E. M. F. of 10^8 C. G. S. units (1 volt) acting through a resistance of 10^9 C. G. S. units (1 ohm).

The unit of QUANTITY is called the *Coulomb:* it is equal to $\frac{1}{10}$ C. G. S. unit; and is equal to one ampere lasting for one second.

The unit of E. M. F. is called the *Volt:* it is equal to 10^8 C. G. S. units; and is equal to producing a current of one ampere through a resistance of one ohm.

The unit of RESISTANCE is called the *Ohm:* it is equal to 10^9 C. G. S. units. One volt acting through it produces one ampere of current.

The unit of CAPACITY is called the *Farad:* it is equal to $1 \div 10^9$ C. G. S. units; and it is the capacity of a condenser, which, charged to a potential of one volt, will contain one coulomb of electricity.

To make the above more intelligible, the concrete representations of some may be cited. A single cell of Daniell battery gives an E. M. F. of 1·07 volt. A current of one *ampere* strength decomposing water, disengages 0·172 cubic centimetres of hydrogen and oxygen at 0° C. and 760 mm. barom. per second: this quantity represents, therefore, one *coulomb*. The *ohm* is represented very nearly by the resistance of a column of mercury one sq. millimeter in section, and 106·24 centimetres in length.

Compound units also may be made up from the above. The principal one, the *volt-ampere*, often called the *watt*, is a convenient and much-used unit of power or rate of work: 746 watts are equal to one horse-power.

Many other units of inductance and of other qualities are used; and there is a disposition to introduce new ones. The above are the principal ones, however, and answer nearly all purposes. By placing *meg-* or *mega-* before a unit it is multiplied by 10^6, or one million (meg-ohm = one million ohms). In like manner *myria-* multiplies by 10^4, or ten thousand; *kilo-* by 10^3, or one thousand; *milli-* divides by 10^3, and *micro-*, or *micr-*, divides by 10^6.

UNIVALENT, a. *ū-nĭv'ă-lĕnt* [L. *ūnus*, one; *valens* or *valen'tem*, having strength; *valērĕ*, to have strength]: in *chem.*, applied to an element whose atom is supposed to have only one combining power (see VALENCY).

UNIVALVE, n. *ū'nĭ-vălv* [L. *ūnus*, one; *valvæ*, the folds or leaves of a door]: a shell consisting of a single piece, such that of the snail, periwinkle, limpet, and other gasteropodous mollusks (see GASTEROPODA: MOLLUSCA): ADJ. having one valve or piece only. U'NIVAL'VULAR, a. *-vū-lĕr*, or U'NIVALVED, a. *-vălvd*, having one valve only.

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